EYFS - Animals, including humans

Development Matters objectives:

3-4 year olds will be learning to:

- Understand the key features of the life cycle of a plant and an animal
- Begin to understand the need to respect and care for the natural environment and all living things
- Make healthy choices about food, drink, activity and toothbrushing.

Reception will be learning to:

- Explore the natural world around them
- Describe what they see, hear and feel outside
- Know and talk about the different factors that support their overall health and wellbeing
- Recognise some environments that are different to the one in which they live

Early Learning Goals

- Explore the natural world around them, making observations and drawing pictures of animals and plants
- Understand some important processes and changes in the natural world around them

Key knowledge:

- Humans grow
- Healthy choices are important to maintain health and well-being
- Pupils know how to care for their teeth
- The human body is made up of a skeleton which keeps us upright and muscles that help us move our body
- The human skeleton is made up of different bones i.e skull, spine, hip bone etc.

Pupils will work scientifically by:

- Considering 'how' and 'why' things happen.
- Knowing more, so feeling confident about coming up with their own ideas.
- Making links between their ideas
- Asking questions to find out more and to check they understand what has been said to them.
- Using drawings to represent ideas
- Return to and build on their previous learning, refining ideas and developing their ability to represent them.

We will:

- Look at photographs of us as a baby and see how we have changed
- Have a visit from dental practitioner
- Find out more about the importance of healthy choices regarding lifestyle
- Dental hygiene programme
- Explore a human skeleton

Prior learning:

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

EYFS - Animals, including humans

Future learning:

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).
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)

Common misconceptions:

Some children may think:

- All animals lay eggs
- The young animal is fully formed inside an egg and just waiting to hatch
- The young animal is fully formed inside an egg and just grows until it is big enough to hatch
- Animals are assembled from body parts within the egg
- All animal young are just small versions of the adult and get bigger
- Animals such as cows and hens "make" milk and lay eggs for us [humans]
- Humans are not animals.
- Animals are furry and have four legs
- Abee is not an animal because it is an insect
- Animals adapt to their surroundings, e.g. a brown bear turns white and becomes a polar bear
- Animals living in the soil breathe by coming to the surface
- Dragons and other mythical creatures are real animals.
- Babies are in a mummy's stomach.
- Sons look like their fathers and daughters look like their mothers.

Vocabulary:

Nursery:
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, 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, mane, webbed feet, senses, elderly

Reception:
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, 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:
Environment, polar regions, ocean, camouflage, bald, elderly, wrinkles, male, female, freckles

EYFS-Living things and their habitats

Development Matters objectives:

3-4 year olds will be learning to:
- 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.

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

Early Learning Goals:
- Explore the natural world around them, making observations and drawing pictures of animals
- Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class

Key knowledge:

- Different animals have different habitats such as deserts, rainforests, oceans and polar regions
- Spiders live in webs
- Worms live in damp soil underground

Pupils will work scientifically by:

- Making links between their ideas
- Asking questions to find out more and to check they understand what has been said to them.
- Exploring their surroundings with all their senses
- Using drawings to represent ideas
- Return to and build on their previous learning, refining ideas and developing their ability to represent them.

We will:

- Look at different habitats around the world, the animals that live there and why, especially polar, deserts, rainforests and oceans.
- Look at minibeasts in our own environment.especially spiders and worms and investigate their habitats
- Go on a bug hunt
- Make a wormery

Prior learning:

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

EYFS - Living things and their habitats

Future learning:

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)
Explore and compare the differences between things that are living, dead, and things that have never been alive. (Y2 – Living things in their habitat)
Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 – Living things in their habitat)

Common misconceptions:

Some children may think:

- Shells are only found at the beach
- Feathers are from dead birds.
- Trees are not plants
- Trees are not living as they do not seem to change or grow
- Weeds are bad plants.

Vocabulary:

Nursery:
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

Reception:
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

EYFS - Seasonal Change

Development Matters objectives:

3-4 year olds will be learning to:

- Talk about what they see, using a wide vocabulary

Reception will be learning to:

- Explore the natural world around them
- Understand the effect of changing seasons on the natural world around them

Early Learning Goals

- Understand some important processes and changes in the natural world around them, including the seasons

Key knowledge:

- There are 4 seasons each year
- Autumn is a season - the weather gets darker, it gets colder, the leaves change and fall off, some animals hibernate
- Winter is a season - it gets darker and colder, the trees are bare
- Spring is a season - plants begin to grow again, the days get longer/nights get shorter, lamb, chicks, tadpoles are born
- Summer is a season - the weather is warm, the days are long, trees are full of leaves, lots of plants grow

Pupils will work scientifically by:

- Considering 'how' and 'why' things happen.
- Making links between their ideas
- Asking questions to find out more and to check they understand what has been said to them.
- Exploring their surroundings with all their senses
- Using drawings to represent ideas
- Return to and build on their previous learning, refining ideas and developing their ability to represent them.

We will:

- Take seasonal walks around the school grounds to observe the changes that are occurring and compare and contrast
- Carry out ice investigations
- Grow seeds
- Go on a leaf hunt
- Do some leaf printing/collages
- Investigate Harvest

Prior learning:

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

Future learning:

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)

EYFS - Seasonal Change

Common misconceptions:

Some children may think:

- It always snows in winter
- It is always hot in the summer
- All babies and young animals are born in spring
- Plants only have flowers in the spring and summer
- Animals sleep during winter
- It rains to help the plants grow
- When it is hotter, it is because the Sun is closer
- God controls the weather.

Vocabulary:

Model and encourage children to use vocabulary such as:
Spring, summer, autumn, winter, seasons, sunny, cloudy, hot, warm, cold, shower, raining, storm, thunder, lightning, hail, sleet, snow, icy, frost, puddles, windy, rainbow, animals, young, plants, flowers

Expose children to supplementary vocabulary such as:
Hibernate, migrate, snowflake

EYFS - Materials

Development Matters objectives:

3-4 year olds will be learning to:

- 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.

Reception will be learning to:

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

Early Learning Goal

- Understand some important processes and changes in natural world around them, including changing states of matter

Key knowledge:

- Ice warms up, it melts and turn into water
- There are different types of materials with different uses
- Some materials are good for building houses
- Some materials float and some sink
- Plastic is a useful material but it lasts a long time and can damage the ocean
- We can help our planet and animals by recycling

Pupils will work scientifically by:

- Responding to new experiences
- Considering 'how' and 'why' things happen.
- Knowing more, so feeling confident about coming up with their own ideas.
- Making links between their ideas
- Asking questions to find out more and to check they understand what has been said to them.
- Exploring their surroundings with all their senses
- Exploring collections of materials and objects with similar/different properties
- Using drawings to represent ideas
- Return to and build on their previous learning, refining ideas and developing their ability to represent them.

We will:

- Explore ice during the winter
- Freeze objects for children to explore
- Investigate materials via story i.e The Three Little Pigs
- Investigate floating and sinking
- Find out about recycling and set up recycling station within the EYFS/school
- Organise a litter pick

Prior learning:

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

EYFS - Materials

Future learning:

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)

Common misconceptions:

Some children may think:

- A material is better to use because it is 'bigger' not thicker, rigid etc.
- The material is 'box' not cardboard.
- Material only means fabric
- All plastic/wood etc. is the same.

Vocabulary:

Nursery:
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

Reception:
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

EYFS - Plants

Development Matters objectives:

3-4 year olds will be learning to:

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

Reception will be learning to:

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

Early Learning Goals

- Explore the natural world around them, making observations and drawing pictures of animals and plants
- Understand some important processes and changes in the natural world around them

Key knowledge:

- Humans and plants grow
- To look after a plant we must give it soil (nutrients), water and light
- A seed will grow into a plant
- A plant has a root and a stem
- We can grow our own food, flowers and plants

Pupils will work scientifically by:

- Responding to new experiences
- Knowing more, so feeling confident about coming up with their own ideas.
- Making links between their ideas
- Asking questions to find out more and to check they understand what has been said to them.
- Exploring their surroundings with all their senses
- Exploring collections of materials and objects with similar/different properties
- Observing plants closely
- Using drawings to represent ideas
- Return to and build on their previous learning, refining ideas and developing their ability to represent them.

We will:

- Observe plants in our environment, explaining why some things occur and discuss changes
- Draw plants in our environment
- Plant seeds and care for them, observing their growth and the conditions that promote it

Prior learning:

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

EYFS - Plants

Future learning:

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

Common misconceptions:

Some children may think:

- Trees are not plants
- There is a young plant inside a seed or bulb
- Bulbs are big seeds
- Big plants grow from big seeds and big bulbs
- Fruit and vegetables come from the supermarket
- Plants grow at night or when we are not watching them.

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

Year 1 - Plants

National curriculum objectives:

- 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

Prior knowledge:

Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.

Future knowledge:

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) • Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 - Living things and their habitats) • Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. (Y3 - Plants) • Investigate the way in which water is transported within plants. (Y3 Plants)

We will:

- Understand what plants need in order to grow. We will do this by planting seeds in different conditions and we will observe them everyday to see what has changed.
- Understand the different parts of a plant and their purpose. We will do this by looking at a small pot plant and children will be able to see the roots, stem, leaves and flower. We will then talk about the importance of each of these parts of the plant.
- Pupils will understand the difference between common garden plants and wild plants. Pupils will be encouraged to describe the characteristics of these plants and how they are different.
- Pupils will use the local environment in order to explore deciduous and evergreen trees. Pupils will also look at images and videos of trees in order to sort them. We will also look at how these different trees change throughout the four seasons.

Key knowledge:

- Pupils will use the local environment throughout the year to explore and answer questions about plants growing in their habitat.
- Pupils will observe the growth of flowers and vegetables that they have planted.
- Pupils will become familiar with common names of flowers, examples of deciduous and evergreen trees.
- Pupils will become familiar the structure of a plant, including leaves, flowers, petals, fruit, roots, bulb, seed, trunk, branches and stem.

Pupils will work scientifically by:

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

Year 1 - Plants

Vocabulary:

Leaf, flower, blossom, petal, fruit, berry, root, bulb, seed, trunk, branch, stem, bark, stalk, bud, germin, Deciduous, Evergreen trees.

Names of trees in the local area.

Names of garden and wild flowering plants in the local area.

Common misconceptions:

Some children may think:

- Plants are flowering plants grown in pots with colored 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

Year 1 - Animals including humans

National curriculum objectives:

- 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.

Prior knowledge:

Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.

Future knowledge:

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. (Y2 - Living things and their habitats) • 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. (Y6 - Living things and their habitats) • Give reasons for classifying plants and animals based on specific characteristics. (Y6 - Living things and their habitats)

We will:

- Identify and name a variety of common animals that are carnivores, herbivores and omnivores.
- Identify and name a variety of common animals. We will do this by looking at different animals including fish, amphibians, reptiles, birds and mammals. We will look at what is the same about these animals and what is different.
- Label different parts of the human body. We will do this by drawing a picture of ourselves and labelling the different parts of our body.
- Understand that certain body parts are associated with different senses. We will do this by looking at our own five senses.
    - Sight - Pupils to find out about how the eye works and the different parts of the eye.
    - Touch - Pupils will describe different materials that are in a bag just by what they can feel.
    - Smell - Pupils to identify different objects using their sense of smell.
    - Taste - Pupils will have a variety of sweet, salty and sour foods to try and group.
    - Sound - Pupils to go on a sound walk inside and outside and they will listen to different sounds and guess what they are

Key knowledge

- Pupils will use the local environment throughout the year to explore and answer questions about animals in their habitat.
- They will understand how to take care of animals take from their local environment and the need to return them safely after study.
- Pupils will become familiar with the common names of some fish, amphibians, reptiles, birds and mammals, including those that are kept as pets.
- Pupils will 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 will 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.
- Using their senses to compare different textures, sounds and smells.

Year 1 - Animals including humans

Vocabulary:

Fish, reptiles, mammals, birds, amphibians, herbivore, omnivore, carnivore, wings, beak, head, body, mouth, teeth, leg, tail, wing, claw, fin, scales, feathers, fur, paws, hooves.

Senses, touch, see, smell, taste, hear, fingers (skin), eyes, nose, ear and tongue.

Names of animals experience first-hand from each vertebrate group.

Common misconceptions:

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.

Year 1 - Everyday materials

National curriculum objectives:

- 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.

Prior knowledge:

.Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.

Future knowledge:

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)

We will:

- Be able to tell the difference between an object and a material.
- Identify and name a variety of everyday materials. We will do this by looking at materials such as wood, plastic, glass, metal, water and rock.
- Describe the physical properties of a variety of everyday materials.
- Explore the properties of materials by conducting experiments. This will include looking at different materials and testing them to see if they are absorbent or not. This will also allow us to group together a variety of different materials.

Key knowledge

- Pupils will 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 will explore and experiment with a wide variety of materials including brick, paper, fabrics, elastic and foil.

Pupils will 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?'

Year 1 - Everyday materials

Vocabulary:

Object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card/cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see through, not see through.

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.

Year 1 - Seasonal changes

National curriculum objectives:

- Observe changes across the four seasons.
- Observe and describe weather associated with the seasons and how day length varies.

Prior knowledge:

Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.

Future knowledge:

Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 - Light) • Use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky. (Y5 - Earth and space) • The seasons and the Earth's tilt, day length at different times of year, in different hemispheres. (KS3)

We will:

- Identify a variety of different changes from Autumn to Winter and then from Spring to Summer
- Create a seasons wheel to show how things change between each season.
- Look at the different tools that we can use to help record the weather.
- Observe the weather over a week to see how this changes.
- Identify how our clothes change in different seasons and why certain clothes are suitable and not.
- Look at how day length varies in different seasons and why it varies.
- Go on walks throughout the year to identify the different signs of the seasons.
- Observe how trees change across the different seasons.

Key knowledge

- Pupils will observe and talk about changes in the weather and the seasons.

Pupils might work scientifically by:

- Making tables and charts about the weather.
- Making displays of what happens in the world around them, including day length as the seasons change.

Year 1 - Seasonal change

Vocabulary:

Weather, sunny, rainy, raining, shower, windy, snowy, cloudy, hot, warm, cold, strom, thunder, lightening, hail, sleet, snow, icy, frost, puddles, rainbow, seasons, winter, summer, spring, autumn, sun, sunrise, sunset, day length.

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.

Year 2 - Living things and their habitats

National curriculum objectives:

- 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 micro-habitats
- 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 foods

We will:

- Explore a number of objects and decide if they are living, dead or never have been alive. We will use the local environment to find objects as well as some others (such as fossils) then question and discuss this to sort the objects and explain why.
- Know the 7 life processes that are common to all living things. We will use the mnemonic MRS GREN to explore the life processes and describe how plants and animals might have different ways of doing this.
- Describe a number of different habitats. Pupils will explore different habitats and describe some of the plants and animals which live there. This includes the fact that habitats need to provide: food, water and shelter.
- Compare different habitats around the world. Pupils will look at a number of different habitats from around the world and describe the similarities and differences between these habitats, including the animals which survive there and the plants which grow.
- Understand why animals are suited to their habitats. Pupils can explain why animals are suited to their habitats and why some animals are unable to survive here.
- Create simple food chains relating to the habitats. Pupils understand the idea of predators, prey, consumer and producer to create simple food chains based on a number of different habitats. Pupils know that all food chains must start with a producer and this must be a plant.
- Look at and explore micro-habitats. Pupils look at and explore the local environment to find a number of micro-habitats. Pupils to create simple food chains from within these habitats.

Key knowledge

- Pupils know that all living things have certain characteristics that are essential for keeping them alive and healthy.
- Pupils know the life processes that are common to all living things.
- Pupils are introduced to the terms 'habitat' (a natural environment or home of a variety of plants and animals) and 'micro-habitat' (a very small habitat, for example for woodlice under stones, logs or leaf litter).
- Pupils explore 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.

Pupils 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 for example: 'Is a flame alive? Is a deciduous tree dead in winter?' and talk about ways of answering their questions.
- They construct a simple food chain that includes humans (e.g. grass, cow, human).
- They describe the conditions in different habitats and micro- habitats (under log, on stony path, under bushes) and find out how the conditions affect the number and types of animals which live there.

Year 2 - Living things and their habitats

Vocabulary:

Living, dead, never been alive, suited, suitable, basic needs, food, food chain, shelter, move, feed,
pond, woodland, forest, field, desert, artic, polar, rainforest, ocean
Habitat, micro-habitat.

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'.

Prior knowledge:

Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants)
Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants)
Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals including humans)
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)

Future knowledge:

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)
Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats)
Construct and interpret a variety of food chains, identifying producers, predators and prey. (Y4 - Animals, including humans)

Year 2 - Plants

National curriculum objectives:

- Pupils 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.

Key knowledge

- Pupils use the local environment throughout the year to observe how different plants grow.
- Pupils are introduced to the requirements of plants for germination, growth and survival, as well as to the processes of reproduction and growth in plants.

Pupils work scientifically by:

- Pupils observe and record, 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.
- Pupils set up a comparative test to show that plants need light and water to stay healthy.

We will:

- Explore the local environment at different times of the year. We will link this to seasonal changes and what happens to plants during the seasons.
- All pupils will plant a sunflower seed and observe the changes of this measuring the size of the plant and what has happened.
- Pupils have the opportunity to see what happens at the end of the process and how this can begin again.
- Pupils know what the word germination means and watch this in action using the sunflower seed and also a bean which they have planted.
- Pupils to know the different methods of reproduction in plants and how seeds can be spread in different ways.
- Pupils to test what happens to plants when they are put in different conditions. This will include exploring the importance of light and water in the growth of plants.

Year 2 - Plants

Vocabulary:

Leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bark, stalk, bud
Light, shade, sun, warm, cool, water, grow, healthy

Common misconceptions:

Some children may think:

- Plants are not alive as they cannot be seen to move.
- Seeds are not alive.
- All plants started out as seeds.
- Seeds and bulbs need sunlight to germinate.

Prior knowledge:

Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants).
Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants).

Future knowledge:

Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. (Y3 - Plants).
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. (Y3 - Plants).
Investigate the way in which water is transported within plants. (Y3 - Plants).
Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)

Year 2 - Animals including humans

National curriculum objectives:

- 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.

Key knowledge

- 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 be introduced to the processes of reproduction and growth in animals.
- N.B - 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.

Pupils might work scientifically by:

- Observing, through video or first-hand observation and measurement, how different animals, including humans, grow
- Ask questions about what things animals need for survival and what humans need to stay healthy; and suggesting ways to find answers to their questions.

We will:

- Pupils will identify the different animal groups working on previous knowledge from year one.
- Pupils identify animals which are: mammals, fish, reptiles, amphibians and birds and the different features of animals which fit into these groups.
- Pupils understand the basic needs to animals survival and work on their knowledge of MRS GREN to complete this.
- Pupils understand the cycle of growth of both humans and animals and know that animals need to reproduce in order to survive.
- Pupils investigate the effect which exercise has on the body and how this affects heart rate.
- Pupils describe a healthy diet and can identify different food groups which humans need in order to keep healthy.
- Pupils understand personal hygiene, including keeping their teeth healthy and the importance of hand-washing - Germ investigation - glitter hands .

Year 2 - Animals including humans

Vocabulary:

Offspring, reproduction, growth, child, young/old stages (examples - chick/hen, baby/child/adult, caterpillar/butterfly), exercise, heartbeat, breathing, hygiene, germs, disease,
food types (examples – meat, fish, vegetables, bread, rice, pasta)

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.

Prior knowledge:

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

Future knowledge:

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 differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats).
Describe the life processes of reproduction in some plants and animals. (Y5 - Living things and their habitats).
Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Y6 - Animals, including humans).

Year 2 - Uses of everyday materials

National curriculum objectives:

- 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.

Key knowledge

- Pupils 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).
- Pupils 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 find out about people who have developed useful new materials, for example John Dunlop, Charles Macintosh or John McAdam.

Pupils 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)
- Observe closely, identifying and classifying the uses of different materials, and recording their observations.

We will:

- Pupils can identify and sort a number of everyday materials. All pupils to be able to explain why the materials can be sorted in different ways and how different materials can have different properties.
- Pupils explore the school grounds to be able to identify materials and describe why they have been used for this purpose.
- Pupils will test different materials based upon their properties. Predicting initially if materials will have the property (e.g waterproof) and then testing this.
- Absorbency investigation - pupils to make predictions based upon the absorbency of the fabrics and then test these, drawing up conclusions based upon the testing.
- Creating a waterproof cape. Pupils to design and make their own superhero choosing materials carefully to ensure this is waterproof.
- To explore the lives of John Dunlop and John McAdam in their uses of materials such as rubber and also in using materials to build roads.

Year 2 - Uses of everyday materials

Vocabulary:

Names of materials – wood, plastic, rubber, paper, cardboard, glass, stone, brick, sand. hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see through, not see through opaque, transparent and translucent, reflective, non-reflective, flexible, rigid Shape, push/pushing, pull/pulling, twist/twisting, squash/squashing. Bend/bending, stretch/stretching

Prior knowledge:

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).

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.

Future knowledge:

Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. (Y3 - Rocks).
Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets).
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).
Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. (Y5 - Properties and changes of materials).

Year 3 - Plants

National curriculum objectives:

- 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

Key knowledge

- 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.

We will:

- Closely observe a variety of flowers with magnifiers.
- Create a model flower and begin to know and label the different parts of it.
- Observe what happens to plants over time when the leaves or roots are removed.
- Observe the effect of putting cut white carnations or celery in coloured water.
- Investigate what happens to plants when they are put in different conditions e.g. in darkness, in the cold, deprived of air, different types of soil, different fertilisers, varying amount of space.
- Spot flowers, seeds, berries and fruits outside throughout the year.
- Observe flowers being visited by pollinators e.g. bees and butterflies in the summer.
- Research different types of seed dispersal.
- Classify seeds in a range of ways, including by how they are dispersed.

Year 3 - Plants

Vocabulary:

Photosynthesis, pollen, insect/wind pollination, seed formation, seed dispersal – wind dispersal, animal dispersal, water dispersal - air, nutrients, minerals, soils, absorb, transport.

Prior knowledge:

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).

Common misconceptions:

Some children may think:

- Plants eat food
- Food comes from 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 such in water which is then sucked up the stem.

Future knowledge:

Describe the life processes of reproduction in some plants and animals. (Y5 - Living things and their habitats).
Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. (KS3)

Year 3 - Animals including Humans

National curriculum objectives:

- 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.

Key knowledge

- 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.

We will:

- Classify food in a range of ways.
- Use food labels to explore the nutritional content of a range of food items.
- Use secondary sources to find out the types of food that contain the different nutrients.
- Use food labels to answer enquiry questions e.g. How much far do different types of pizza contain? How much sugar is in soft drinks?
- Plan a daily diet to contain a good balance of nutrients.
- Explore the nutrients contained in fast food.
- Use secondary sources to research the parts and functions of the skeleton.
- Investigate patterns asking questions such as: Can people with longer legs run faster? Can people with bigger hands catch a ball better?
- Compare, contrast and classify skeletons of different animals.

Year 3 - Animals including humans

Vocabulary:

Nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, support, protect, move, skull, ribs, spine, muscles, joints, support, protect, move, skull, ribs, spine.

Prior knowledge:

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 animal that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans).
Describe and compare the structure of a variety of common animals (fiish, amphibians, reptiles, birds and mammals, including pets.) (Y1 - Animals, including humans).
Find out about and describe the basic needs of animals, inclluidng humans, for survival (water, food and air). (Y2 - Animals, including humans).
Describe the importance of humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans).

Common misconceptions:

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.

Future knowledge:

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).
Construct and interpret a variety of food chains, identifying producers, predators and prey. (Y4 - Animals, including humans).
Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Y6 - Animals, including humans).

Year 3 - Rocks

National curriculum objectives:

- 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

Key knowledge

- 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.

We will:

- Devise tests to explore the properties of rocks and use data to rank the rocks
- Lnk rocks changing over time with their properties e.g. soft rocks get worn away more easily
- Present in different ways their understanding of how fossils are formed e.g. in role play, comic strip, chronological report, stop-go animation etc.
- Identify plant/animal matter and rocks in samples of soil
- Devise a test to explore the water retention of soils
- Observe rocks closely
- Classify rocks in a range of ways based on their appearance
- Devise a test to investigate the hardness of a range of rocks
- Devise a test to investigate how much water different rocks absorb
- Observe how rocks change over time e.g. gravestones or old building
- Research using secondary sources how fossils are formed
- Observe soils closely
- Classify soils in a range of ways based on their appearance
- Devise a test to investigate the water retention of soils
- Observe how soil can be separated through sedimentation
- Research the work of Mary Anning
- Be introduced to more recent palaeontologists such as Robert Bakker who was one of the technical advisers for the original Jurassic Park .

Year 3 - Rocks

Vocabulary:

Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil

Prior knowledge:

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 maeterials).
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).

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 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.

Future knowledge:

Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. (Y6 - Evolution and inheritance).
The composition of the Earth. (KS3).
The structure of the Earth. (KS3).
The rock cycle and the formation of igneous, sedimentary and metamorphic rocks. (KS3).

Year 3 - Light

National curriculum objectives:

- 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

Key knowledge:

- 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.

We will:

- Describe how we see objects in light and can describe dark as the absence of light
- State that it is dangerous to view the sun directly and state precautions used to view the sun, for example in eclipses
- Define transparent, translucent and opaque
- Describe how shadows are formed by objects blocking light
- Explore how different objects are more or less visible in different levels of lighting
- Explore how objects with different surfaces e.g. shiny vs matt are more or less visible
- Explore how shadows vary as the distance between a light source, an object or surface is changed
- Explore shadows which are connected to and disconnected from the object e.g. shadows of clouds and children in the playground
- Choose suitable materials to make shadow puppets
- Create artwork using shadows, shadow puppets.
- Make sunlight patterns by placing leaves on sugar paper (the sun will bleach the paper)

Year 3 - Light

Vocabulary:

Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous

Prior knowledge:

Explore how things work. (EYFS)
Talk about the differences in materials and changes they notice. (EYFS)
Describe what they see, hear and feel whilst outside. (EYFS)
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).

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 the 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.

Future knowledge:

Recognise that light appears to travel in straight lines. (Y6 - Light).
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. (Y6 - Light).
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. (Y6 - Light).
Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. (Y6 - Light).

Year 3 - Forces and magnets

National curriculum objectives:

- Compare how things move on different surfaces
- Notice that some forces need contact between two objects, but magnetic forces can act at a distance
- Observe how magnets attract or repel each other and attract some materials 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 two poles
- Predict whether two magnets will attract or repel each other, depending on which poles are facing

Key knowledge:

- 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.

We will:

- Give examples of forces in everyday life
- Give examples of objects moving differently on different surfaces
- Name a range of types of magnets and show how the poles attract and repel
- Draw diagrams using arrows to show the attraction and repulsion between the poles of magnets
- Carry out investigations to explore how objects move on different surfaces e.g. spinning tops/coins, rolling balls/cars, clockwork toys, soles of shoes etc.
- Explore what materials are attracted to a magnet
- Classify materials according to whether they are magnetic
- Explore the way that magnets behave in relation to each other
- Use a marked magnet to find the unmarked poles on other types of magnets
- Explore how magnets work at a distance e.g. through the table, in water, jumping paper clip up off the table
- Devise an investigation to test the strength of magnet
- Explore the use of magnets in 'real life'

Year 3 - Forces and magnets

Vocabulary:

Force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole

Common misconceptions:

Some children may think:

- The bigger the magnet the stronger it is.
- All metals are magnetic.

Prior knowledge:

Explore how things work. (EYFS).
Explore and talk about different forces they can feel. (EYFS).
Talk about the differences between materials and changes they notice. (EYFS).
Explore the natural world around them. (EYFS).
Describe what they see, hear and feel whilst outside. (EYFS).
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).

Future knowledge:

Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. (Y5 - Forces).
Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. (Y5 - Forces).
Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. (Y5 - Forces),
Magnetic fields by plotting with compass, representation by field lines. (KS3).
Earth's magnetism, compass and navigation. (KS3).

Year 4 - Living things and their habitats

National curriculum objectives:

- 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.

Key knowledge:

- 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 and flowering plants and non-flowering plants.
- Pupils could begin to put vertebrate animals into groups such as 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, such as 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.

We will:

- Recognise that living things can be grouped in a variety of ways by sorting living things into a range of groups.
- Explore and use classification keys to help group, identify and name a variety of living things in our 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. Using straightforward scientific evidence to answer questions by exploring how we 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.
- 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.

Year 4 - Living things and their habitats

Vocabulary:

Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate.

Prior knowledge:

Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants).
Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants).
Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals, including humans).
Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 - Animals, including humans).
Identify and name a variety of plants and animals in their habitats including microhabitats. (Y2 - Living things and their habitats).

Common misconceptions:

Some children may think:

- The death of one of the parts of the 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.

Future knowledge:

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).
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. (Y6 - Living things and their habitats).
Give reasons for classifying plants and animals based on specific characteristics. (Y6 - Living things and their habitats).

Year 4 - Animals, including humans

National curriculum objectives:

- 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.

Key knowledge:

- 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.

We will:

- Research the function of the parts of the digestive system
- Create a model of the digestive system using household objects.
- Use diagrams or models to describe the journey of food through the body.
- Explore eating different types of food to identify which teeth are being used for cutting, tearing and grinding (chewing).
- Explain the role of the different types of teeth.
- Classify animals as herbivores, carnivores or omnivores according to the type of teeth they have in their skulls.
- Explain how the teeth in animal skulls show they are carnivores, herbivores or omnivores.
- Construct a food change.
- Use food chains to identify producers, predators and prey within a habitat.
- Use secondary sources to identify animals in a habitat and find out what they eat.

Year 4 - Animals, including humans

Vocabulary:

Digestive system, digestion, mouth, teeth, saliva, oesophagus, stomach, small intestine, nutrients, large intestine, rectum, anus, teeth, incisor, canine, molar, premolars, herbivore, omnivore, carnivore, producer, predator, prey, food, chain.

Prior knowledge:

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).

Common misconceptions:

Some children may think:

- Arrows in a food chains mean 'eat'.
- 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'.

Future knowledge:

Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. (Y6 - Animals, including humans).
Recognise the impact of diet and exercise, drugs and lifestyle on the way their bodies function. (Y6 - Animals, including humans).
Describe the ways in which nutrients and water are transported within animals, including humans. (Y6 - Animals, including humans).

Year 4 - States of Matter

National curriculum objectives:

- 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.

Key knowledge:

- 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.

We will:

- Sort materials into solids, liquids and gases.
- Investigate gases and their uses
- Investigate how heating and cooling can change a material's state.
- Exploring how water can change its state to a solid, liquid or a gas.
- Investigate the effect of temperature on drying washing.
- Display 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.

Year 4 - States of Matter

Vocabulary:

Solid, liquid, gas, heating, cooling, state change, melting, freezing, melting point, boiling, boiling point, evaporation, condensation, temperature, water cycle.

Future knowledge:

Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and responses to magnets. (Y5 - Properties and changes of materials.

Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. (Y5 - Properties and changes of materials).

Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. (Y5 - Properties and changes of materials).

Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. (Y5 - Properties and changes of materials).

Demonstrate the dissolving, mixing and changes of state are reversible changes. (Y5 - Properties and changes of materials).

Explain that some changes results in the formation of new materials and the this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda. (Y5 - Properties and changes of materials.

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 temperate 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 an 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.

Prior knowledge:

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).

Year 4 - Sound

National curriculum objectives:

- Identify how sounds are made, associating some of them with something vibrating recognise that vibrations from sounds travel through a medium to the ear
- 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

Key knowledge:

- 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.

We will:

- Identifying and explaining sound sources around school.
- Perform a dramatisation of how sounds travel.
- Explore how high and low sounds are created.
- Explore and create musical instruments, and explain how they change pitch.
- Explore how sounds change over distance.
- Make string telephones
- Investigate the best material for absorbing sound.
- Make a musical instrument and explaining how it works.
-

Year 4 - Sound

Vocabulary:

Sound, source, vibrate, vibration, travel, pitch, high, low, volume, faint, loud, insulation.

Prior knowledge:

Explore how things work. (EYFS).
Describe what they see, hear and feel whilst outside. (EYFS).
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).

Common misconceptions:

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 loud and low sounds are quiet.

Future knowledge:

Waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel superposition. (KS3).
Frequencies of sound waves, measured in Hertz; echoes, reflection and absorption of sound. (KS3).
Sound needs a medium to travel, the speed of sound in air, in water, in solids. (KS3).
Sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal. (KS3)
Auditory range of humans and animals. (KS3).
Pressure waves transferring energy; use for cleaning and physiotherapy by ultrasound. (KS3)
Waves transferring information for conversion to electrical signals by microphone. (KS3).

Year 4 - Electricity

National curriculum objectives:

- 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

Key knowledge:

- 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.

We will:

- Explore appliances and objects that are powered by electricity.
- Explore how electrical components can be arranged to make a bulb light up and draw conclusions.
- Make predictions about if a circuit will work and test them out.
- Discover that some materials allow electricity to flow through them (electrical conductors) and others do not (electrical insulators)
- Test materials for conduction, record findings and draw conclusions.
- Design a circuit that has a particular function choosing the type of switch and components needed.
- Draw a diagram to represent the circuit using recognised symbols.
- Construct an electrical circuit to perform a planned function including a switch.
- Solve problems and make adaptations during the making process to overcome difficulties using knowledge of series circuits.
- Test and make improvements to a circuit.
- Report to others on the making of the circuit using scientific vocabulary.
- Evaluate its effectiveness and suggest possible improvements.

Year 4 - Electricity

Vocabulary:

Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol

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.

Prior knowledge:

Explore how things work. (EYFS).

Future knowledge:

Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. (Y6 - Electricity).
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. (Y6 - Electricity).
Use recognised symbols when representing a simple circuit in a diagram. (Y6 - Electricity).

Year 5 - Living things and their habitats.

National curriculum objectives:

- 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.

Key knowledge

- 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.

We will:

- Use secondary sources and, where possible, first-hand observations to find out about the life cycle of a range of animals.
- Compare the gestation times for mammals and look for patterns e.g. in relation to size of animal or length of dependency after birth.
- Look for patterns between the size of an animal and its expected life span.
- Grow and observe plants that reproduce asexually e.g. strawberries, spider plants, potatoes.
- Take cuttings from a range of plants e.g. African violet, mint.
- Plant bulbs and then harvest to see how they multiply.
- Use secondary sources to find out about pollination.

Year 5 - Living things and their habitats.

Vocabulary:

Life cycle, reproduce, sexual, fertilises, asexual, plantlets, runners, tubers, bulbs, cuttings.

Common misconceptions:

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.

Prior knowledge:

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).

Future knowledge:

Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta. (KS3).
Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. (KS3)

Year 5 - Animals, including humans

National curriculum objectives:

- Describe the changes as humans develop to old age.

Key knowledge

- 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.

We will:

- Learn about the changes experienced in puberty.
- Draw a timeline to indicate the stages in the human life cycle.
- Explain how a baby changes physically as it grows, and also what it is able to do.
- Research the gestation periods of other animals comparing them to humans.

Year 5 - Animals, including humans

Vocabulary:

Puberty - the vocabulary to describe sexual characteristics.

Common misconceptions:

Some children may think:

- A baby grows in a mother's tummy.
- A baby is 'made'.

Prior knowledge:

Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans).

Future knowledge:

Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyles on the foetus through the placenta. (KS3).

Year 5 - Properties and changes of materials.

National curriculum objectives:

- 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

Key knowledge:

- 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.
- They should find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton.

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.

We will:

- Investigate the properties of different materials in order to recommend materials for particular functions depending on these properties e.g. test waterproofness and thermal insulation to identify a suitable fabric for a coat.
- Explore adding a range of solids to water and other liquids e.g. cooking oil, as appropriate.
- Investigate rates of dissolving by carrying out comparative and fair test.
- Separate mixtures by sieving, filtering and evaporation, choosing the most suitable method and equipment for each mixture.
- Explore a range of non-reversible changes e.g. rusting, adding fizzy tables to water, burning.
- Carry out comparative and fair tests involving non-reversible changes e.g. What affects the rate of rusting? What affects the amount of gas produced?
- Research new materials produced by chemists e.g. Spencer Silver and Ruth Benerito.

Year 5 - Properties and changes of materials

Vocabulary:

Thermal/electrical, insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material.

Common misconceptions:

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.

Prior knowledge:

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. (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).

Future knowledge:

Chemical reactions as the rearrangement of atoms. (KS3).
Representing chemical reactions using formulae and using equations. (KS3).
Combustion, thermal decomposition, oxidation and displacement reactions. (KS3).
Defining acids and alkalis in terms of neutralisation reactions. (KS3).
The pH scale for measuring acidity/alkalinity; and indicators. (KS3).

Year 5 - Earth and space

National curriculum objectives:

- 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

Key knowledge:

- 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.

We will:

- Plan our own scientific research questions.
- Research the Solar system and facts.
- Learn about Professor Brian Cox and watch Stargazing live. Learn about Galileo
- Create a scale model of the Solar System.
- Learn the difference between geo and heliocentric solar system and how views have evolved.
- Build an orrery of our Solar System.
- Use our research to create a video in the style of Stargazing Live to present our knowledge of the Solar System.
- Carry shadow investigations that help support the idea that the Earth moves on its axis.
- Observe, measure and identify patterns in changing shadows across a day.
- Record a working model of a 'shadow clock' offering observations and scientific explanation.
- Create a sundial and track the Earth's movement.
- Explore time zones and relate to the movement of the Earth.
- Carry out a simulation investigation to demonstrate why the moon appears as it does in the sky.
- Look at photos of the moon and identify features.
- Match lunar phases to relative positions of the Moon, Sun and Earth.

Year 5 - Earth and space

Vocabulary:

Sun, Moon, Earth, planets (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), spherical, Solar System, rotate, star, orbit.

Prior knowledge:

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

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.

Future knowledge:

Our Sun as a star, other stars in our galaxy, other galaxies. (KS3).
The seasons and the Earth's tilt, day length at different times of year, in different hemispheres. (KS3).
The light year as a unit of astronomical distance. (KS3)

Year 5 -Forces

National curriculum objectives:

- 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

Key knowledge

- 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.

We will:

- Know what gravity is and its impact on our lives.
- Investigate the effect of friction in a range of contexts e.g. trainers, bathmats, mats for a helter-skelter.
- Investigate the effects of water resistance in a range of contexts e.g. dropping shapes through water and pulling shapes, such as boats, along the surface of water.
- Investigate the effects of air resistance in a range of contexts e.g. parachutes, spinners, sails on boats.
- Explore how levers, pulleys and gears work.
- Make a product that involves a lever, pulley or gear.
- Create a timer that uses gravity to move a ball.
- Research how the work of scientists such as Galileo Galilei and Isaac Newton helped to develop the theory of gravitation.

Year 5 - Forces

Vocabulary:

Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears.

Prior knowledge:

Compare how things move on different surfaces. (Y3 - Forces and magnets).
Notice that some forces need contact between 2 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 2 poles. (Y3 - Forces and magnets).
Predict whether 2 magnets will attract or repel each other, depending on which poles are facing. (Y3 - Forces and magnets).

Common misconceptions:

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.

Future knowledge:

Forces as pushes or pulls, arising from the interactions between two objects. (KS3).
Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces. (KS3).
Moment as the turning effect of a force. (KS3).
Forces: associated with deforming objects, stretching and squashing - springs; with rubbing and friction between surfactant, with pushing things out of the way; resistance to motion of air and water. (KS3).
Forces measured in Newtons, measurements of stretch or compression as force is changed. (KS3).

Year 6-Living things and their habitats

National curriculum objectives:

- 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

Key knowledge:

- 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.

We will:

- Identify ways in which we currently classify living things.
- Learn that we can subdivide broad groupings using observation.
- Use keys to classify different types of plants and animals in the immediate environment based on their identifiable features.
- Use first-hand observation to identify characteristics shared by the animals in a group.
- Use secondary sources to research the characteristics of animals that belong to a group.
- Give reasons for classifications.
- Use information about the characteristics of an unknown animal or plant to assign it to a group.
- Use secondary sources to learn about the formal classification system devised by Carl Linnaeus and why it is important.
- Classify plants and animals, presenting this in a range of ways e.g. Venn diagrams, Carroll diagrams and keys.
- Create an imaginary animal which has features from one or more groups.

Year 6 -Living things and their habitats

Vocabulary:

Vertbrates, fish, amphibians, reptiles, birds, mammals, invertebrates, warm-blooded, cold-blooded, insects, spiders, snails, worms, flowering, non-flowering, mosses, ferns, conifers.

Common misconceptions:

Some children may think:

- All micro-organisms are harmful.
- Mushrooms are plants.

Prior knowledge:

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).

Future knowledge:

Differences between species. (KS3).

Year 6-Animals including Humans

National curriculum objectives:

- 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

Key knowledge:

- 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.

We will:

- Identify the role of the circulatory system within the body.
- Focus on the role of the lungs, heart, blood vessels and blood.
- Recognise the importance of a healthy lifestyle and understand what this means.
- Understand the effect of drugs on the body.
- Describe ways in which nutrients and water are transported within the body.
- Carry out a range of pulse rate investigations:
    - Fair test - effect of different activities on my pulse rate.
    - Pattern seeking - exploring which groups of people may have higher or lower resting pulse rates.
    - Observation over time - how long does it take my pulse rate to return to my resting pulse rate.
    - Pattern seeking - exploring recovery rate for different groups of people.

Year 6 -Animals including Humans

Vocabulary:

Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs, lifestyle

Prior knowledge:

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.

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

Future knowledge:

The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases. (KS3).
The effects recreational drugs (including substance misuse) on behaviour, health and life processes. (KS3).
The structure and functions of the gas exchange system in humans, including adaptations to function. (KS3).
The mechanism of breathing to move air in and out of the lungs. (KS3).
The impact of exercise, asthma and smoking on the human gas exchange system. (KS3).

Year 6 -Evolution and Inheritance

National curriculum objectives:

- 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

Key knowledge:

- 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.

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.

We will:

- Observe fossils and identify what information they give us about the past.
- Identify similarities and differences between us and our parents.
- Classify inherited characteristics as inherited and non-inherited.
- Identify features in animals and plants that are passed onto offspring and explore this process by considering the artificial breeding of animals or plants e.g. dogs.
- Investigate and research how animals are adapted to their environments.
- Observe and explain how variation in offspring over time can make animals more or less able to survive in an environment (Giraffe's necks)
- Research the work of Charles Darwin and how this led to his theory of evolution.
- Use models to demonstrate evolution e.g. 'Darwin's finches' bird beak activity.
- Analyse advantages and disadvantages of specific adaptations.
- Find out about the work of Mary Anning.

Year 6 -Evolution and Inheritance

Vocabulary:

offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils, evolve, evolution

Prior knowledge:

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. (Y5 - Living things and their habitats)

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.

Future knowledge:

Heredity as the process by which genetic information is transmitted from one generation to the next. (KS3)

A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model. (KS3)

The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection. (KS3)

Changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction. (KS3)

Year 6 - Light

National curriculum objectives:

- 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

Key knowledge

- 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).

We will:

- Identify sources of light and categorise them into natural and man-made.
- Observe sources of light to understand that light travels in straight line from a source.
- Draw diagrams to understand that we see things because light is reflected into our eyes.
- Design and make a periscope to see objects above a barrier.
- Identify the parts of the eye and explain how we see an image.
- Investigate how shadows are created and observe how the shadow that is created is the same shape as the object blocking the light.
- Investigate how the size of a shadow changes as a result of the position of the object in relation to the light source.
- Investigate and observe the refraction of light as it travels through a range of media including water and glass.
- Explain how we see colours as a result of the reflection and absorption of light.

Year 6 -Light

Vocabulary:

As for Year 3 - Light, plus straight lines, light rays

Common misconceptions:

Some children may think:

- We see objects because light travels from our eyes to the object.

Prior knowledge:

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)

Future knowledge:

The similarities and differences between light waves and waves in matter.
(KS3)
Light waves travelling through a vacuum; speed of light. (KS3)
The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface. (KS3)
Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye. (KS3)
Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras. (KS3)
Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse
reflection. (KS3)

Year 6-Electricity

National curriculum objectives:

- 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

Key knowledge:

- 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.
- 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

We will:

- Know that the brightness of a bulb is associated with the voltage.
- Compare and give reasons for variations in how components function.
- Use recognised symbols when representing a simple circuit in a diagram.
- Construct simple series circuits.
- Be able to answer questions about what happens when children try different components, for example; switches, bulbs, buzzers and motors.
- Create our own useful circuits.

Year 6 -Electricity

Vocabulary:

Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor,
switch, voltage

Common misconceptions:

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.

Prior knowledge:

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)

Future knowledge:

Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge.
(KS3)
Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current. (KS3)
Differences in resistance between conducting and insulating components quantitative). (KS3)
Static electricity. (KS3)