Year 1: Everyday Materials (chemistry)
Year 1: Animals including humans (biology)
Year 1: Animals including humans (biology)
Year 1: Seasonal Change (physics)
Year 1: Plants (biology)

Year 2: Uses of Everyday Materials (chemistry)
Year 2: Uses of Everyday Materials (chemistry - continued)
Year 2: Living Things and their Habitats (biology)
Year 2: Living Things and their Habitats (biology) (continued)
Year 2: Plants (biology)
Year 2: Animals including humans (biology)

Year 3: Light (physics)
Year 3:Forces and Magnetism (physics)
Year 3: Rocks and Fossils (chemistry)
Year 3: Plants (biology)
Year 3: Animals including humans (biology)

Year 4: States of Matter (chemistry)
Year 4: Living Things and their Habitats (classification) (biology)
Year 4: Animals Including Humans (Teeth, Digestion and Food Chains) (biology)
Year 4: Electricity (physics)
Year 4: Sound (physics)

Year 5: Properties and Changes of Materials (chemistry)
Year 5: Forces (physics)
Year 5: Earth and Space (physics)
Year 5: Living Things and their Habitats (biology)
Year 5: Animals including humans (biology)

Year 6: Light (physics)
Year 6: Electricity (physics)
Year 6: Animals including humans (circulation) (biology)
Year 6: Living Things and their Habitats (classification including microorganisms) (biology)
Year 6: Evolution and Inheritance (biology)

**Year 1: Ongoing throughout the year - working scientifically**

**National Curriculum objectives:**

NC objectives:

. Sc1/1.1 asking simple questions and recognising that they can be answered in different ways
· Sc1/1.2 observing closely, using simple equipment
· Sc1/1.3 performing simple tests
· Sc1/1.4 identifying and classifying
· Sc1/1.5 using their observations and ideas to suggest answers to questions
. Sc1/1.6 gathering and recording data to help in answering questions

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| **Key concept(s):**<br>-Observing over time<br>-Pattern seeking<br>-Research using Secondary Sources - Identifying & classifying<br>-Comparative tests - Fair tests<br><br>**Vocabulary:**<br>*New learning:*<br><br>**properties,** observe, test, magnifying glass, object, record, equipment | - Know that we can ask questions about the world and that when we observe the world to answer these questions, this is science<br>- Know that we can use magnifying glasses to observe objects closely<br>- Know that we can test our questions to see if they are true<br>- Know that objects can be identified or sorted into groups based on their observable properties<br>- Know that we can write down numbers and words or draw pictures to record what we find<br><br>LONG TERM INVESTIGATIONS - READ AHEAD TO ADD IN LESSONS<br><br>Seasons - as the seasons come focus on that season and then a comparative lesson in summer term.<br><br>Measure and record the children's height at the start of the year and then as the year progresses. |

**Year 1: Everyday Materials (chemistry)**

| *1. Are all materials the same? (simple comparative)* | *2. Which materials are all around us and how can we describe them? / What materials is (our school) made from? (pattern seeking)* | *3. Which material is the most absorbent? (select a material for a puppy's bed) (comparative test)* | *4.Which materials would be best to make an umbrella? (identifying and classifying)* | *5. Which materials can be recycled? (research)* | *6. What happens to shaving foam over time? (observing over time)* |
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**National Curriculum objectives:**

· Sc1/3.1a distinguish between an object and the material from which it is made
· Sc1/3.1b identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock
· Sc1/3.1c describe the simple physical properties of a variety of everyday materials
- Sc1/3.1d compare and group together a variety of everyday materials on the basis of their simple physical properties

**Links to prior learning:**

- 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. (Early Learning Goal)

<u>Common Misconceptions</u>
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.

**Links to future learning:**

- Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials)

- Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)

**Key concept(s):**
NW1. Materials are different and each material is useful for different jobs because of their properties
**Vocabulary:**
*Consolidate:*
**absorption, matter, property,** wood, plastic, glass, metal, water, rock
*New learning:*
Object, material, hard, soft, stretchy, stiff, bendy, rough, smooth, waterproof,

Lesson 1

- **Know that matter (stuff) is made from tiny building blocks.**
- **Know that an object is made from/of a material. To clearly distinguish between the object and the material e.g these are all spoons but are made from different materials (wood, metal, plastic).**
- **Know from observation how to distinguish between materials made of wood, plastic, glass, metal, water, rock.**
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Lesson 2

- **To identify these materials in everyday life (wood, plastic, glass, metal, water, rock)**
- **To name materials in their own, immediate environment.**

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| absorbent, everyday, dull, see through, plastic, recycle | ● **To recognise the same material can look different e.g metal - paperclips (thin bendy), foil (shiny, thin) can (hard, solid) are all metals.**<br><br>Lesson 3<br><br>● To know all materials can have slightly different properties and some properties that are the same e.g metals can be shiny and dull.<br>● Know that materials can be hard, soft, strong, weak, absorbent, heavy, light, solid and runny, smooth and rough; these descriptions denote the properties of a material.<br>● To use the correct scientific vocabulary to describe the properties of the materials.<br>● To be able to sort materials based on their properties.<br><br>Lesson 4<br><br>● **To know that objects are made using materials specific for their use and their properties e.g glass for windows as it is transparent.**<br>● **To know that objects are made using materials that are fit for purpose.**<br>● **To know that some objects are made from a combination of materials for their properties e.g a metal pan has a plastic coated handle as the plastic won't get hot and burn your hand when you pick it up.**<br><br>**Lesson 5**<br><br>● **To know that packaging can be recycled and this is important for the environment.**<br>● **To be able to sort packaging based on its material category - plastic, paper, glass, metal cans.**<br>● **To know that it is everyone's responsibility to care for our planet.**<br><br>**Lesson 6 - see seasonal changes - Autumn lesson**<br><br>**2nd half term of Materials and their properties - Using knowledge from 1st half to apply to investigations.**<br><br>**Lesson 1**<br><br>● **To know that materials have specific properties.**<br>● **To be able to identify properties of materials using the correct vocabulary (hard/soft, shiny/dull, stretchy /stiff, rough/smooth, waterproof/absorbent, dull / see through, opaque / translucent / transparent.**<br><br>**Lesson 2**<br><br>● **To be able to name the properties of materials.**<br>● **To be able to sort materials based on their properties.** |

- **To know that all materials are not the same but some have common features.**

- **T**o know that some materials are magnetic and these are some metals.

**Lesson 3**

- **To know the term 'absorbent' means to soak up a liquid (a liquid is something you can pour such as water).**
- **To identify where absorbent materials are used in everyday life and why they can be helpful - kitchen roll, paper towels, towel, cloths,some fabrics, sponges, cotton wool.**
- **To know some materials are not absorbent.**

**Lesson 4**

- **To use knowledge of materials and their properties to investigate the best material to use to make a puppies bed.**
- **To be able to carry out a comparative fair test.**
- **To know we can only change 1 thing in a fair test (the material) and the other variables (things we can change) need to stay the same (amount of water, size of material, length of time we leave the water on the material).**
- **To observe and talk about the results they have found from doing the test.**

**Lesson 5**

- **To know the term 'waterproof' means to repel a liquid (a liquid is something you can pour such as water).**
- **To know waterproof is the opposite of absorbent.**
- **To identify where waterproof materials are used in everyday life and why they can be helpful - fabric on an umbrella / tent / raincoat , plastic wellington boots, leaf, rubber duck, rubber gloves.**
- **To know some materials are not waterproof.**

**Lesson 6**

- **To use knowledge of materials and their properties to investigate the best material to use to make an umbrella.**
- **To be able to carry out a comparative fair test.**
- **To know we can only change 1 thing in a fair test (the material) and the other variables (things we can change) need to stay the same (amount of water, size of material, length of time we leave the water on the material).**
- **To observe and talk about the results they have found from doing the test.**

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| | • **To record our findings through pictures and writing.** |

**Year 1: Animals including humans (biology)**

| *1. Are we all the same or are we all different? (pattern seeking)* | *2. Can you taste when you can't smell?* | *3.Is our sense of smell stronger when we can't see? (comparative)* | *4.Are all animals totally different? (pattern seeking)* | *5.How could we organise the zoo animals? (classification)* | *6.Does my height change over the year? (observing over time)* |
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**National Curriculum objectives:**

· Sc1/2.2a identify and name a variety of common animals including, fish, amphibians, reptiles, birds and mammals
· Sc1/2.2c describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets)
. Sc1/2.2d identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.

**Links to prior learning:**
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. (Early Learning Goal).

**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.

**Links to future learning:**
- 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)

**Key concept(s):**
N1. Animals and plants are living things, they have similarities and differences .

**Vocabulary:**
*Consolidate:*
energy, growth, habitat, fish, amphibian, reptile, bird, mammal, offspring, carnivore, herbivore, omnivore, vertebrate, skeleton, organ

*New learning:*
cleanliness, aroma, healthy, exercise, hearing, require, carnivore, omnivore, herbivore, identify, predator, construct, responsibility, grouping

**Lesson 1**
- **To know humans are animals and humans are mammals.**
- **To know that parts of the human body have specific scientific names.**
- **Know that feet, legs, arms, hands, torso, head, skin, ears, eyes, nose, mouth and tongue are parts of the body and identify them.**

**Lesson 2 / 3**
- **To know that eyes are associated with sight, ears with sound, nose with smell, tongue with taste and skin with touch.**
- **To know that these associations are called our senses and they enable us to find out about the world around us.**
- **To use their senses to find out about the world around them.**

❖ Some people's senses don't work as well as others and there are things that can help them find out about the world around them.
❖ Blind people use braille, lack of sight helped by glasses, deaf people use hearing aids and lip reading / subtitles

**Lesson 4**

- **To know that animals can be classified into groups based on their features and conditions for living.**
- **To know animals are grouped into 1 of 5 groups.**
- **To be able to know an example of an animal for each group - Know that a trout is an example of fish, a frog is an example of an amphibian; a lizard is an**

**example of a reptile; a robin is an example of a bird; a rabbit and a human are examples of a mammal.**

**Lesson 5**

- **To be able to explain key features of animals from each group**
- **Know that fish are different in having gills so that they can breathe underwater and scaly skin**
- **Know that amphibians are different in that they begin their lives with gills but then develop lungs and breath on land**
- **Know that reptiles are different in that they breath air and have scaly skin**
- **Know that birds are different to other animals in that they have feathers and wings**
- **Know that mammals are different to other animals in that they have fur/hair and they feed milk to their young**

**Lesson 6**

- **To know that fish, amphibians, reptiles, birds and mammals are similar in that they have internal skeletons and organs; these are known as vertebrates, which means they are animals that have a backbone, this is called a spine.**
- **Animals that don't have a backbone are called an invertebrate (snail, jelly fish, spider).**
- **To identify animals from their skeletons and explain why it is of that animal.**

**Classification. How can we organise zoo animals?**

- **To be able to organise animals based on their classified animal group.**

| **Year 1: Animals including humans (biology)** | | | | | |
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| *1.*Do all animals have a skeleton? (identify and classify) | *2. How would the zookeeper feed the different animals? (sources)* | *3.How could we group the different animals' food?* | *4.* | *5.* | *6.* |

**National Curriculum objectives:**

· *Sc1/2.2a identify and name a variety of common animals including, fish, amphibians, reptiles, birds and mammals*
- Sc1/2.2c describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets
· Sc1/2.2b identify and name a variety of common animals that are carnivores, herbivores and omnivores

| **Links to prior learning:** | **Links to future learning:** |
|---|---|
| Children know about similarities and differences in relation to places, objects, materials and | -Describe how animals obtain their food from plants and other animals, using the idea of a |

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| 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. (Early Learning Goal)<br><br>**Common Misconceptions**<br>Some children may think: animals all get fed as pets do. | simple food chain, and identify and name different sources of food. (Y2 - Living things and their habitats)<br>-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)<br>-Give reasons for classifying plants and animals based on specific characteristics. (Y6 - Living things and their habitats) |

**Key concept(s):**
*Animals and plants are living things, they have similarities and differences.*

**Vocabulary:**
*Consolidate:*
(from last unit) energy, growth, habitat, fish, amphibian, reptile, bird, mammal, diet, prey,

*New learning:*
carnivore, herbivore, omnivore,

Lesson 1

- Animals need food sources to stay alive.
- Animals are either a carnivore / herbivore / omnivore based on their diet.

Lesson 2

- Know that herbivorous animals eats plants;
- Know that a carnivorous animal eats other animals;
- Know that omnivorous animals eat both animals and plants
- Know that a cat is an example of a carnivore;
- Know that a rabbit is an example of a herbivore;
- Know that many humans are examples of omnivores (though not vegetarians)

Lesson 3

- To know key features of animals in relations to the diet group they are in.
- To know carnivores have sharp teeth and claws, herbivores usually have two blunt front teeth to aid gnawing.

Lesson 4

- Some animals are predators and some are the prey.
- Animals are in a food chain - examples of animals at the top and bottom of the food chain.

Lesson 5

- To know the habitat of an animal is based on what they eat and what lives there.
- How some animals try to escape their predators (camouflage, roll into a ball, escape).
- Focus on 1 animal for an animal study - research what they eat, where they live, features of their body and skeleton.

Lesson 6 - seasonal changes - see unit of work

**Year 1: Seasonal Change (physics)** **THIS UNIT WILL NEED TO RUN THROUGHOUT THE YEAR**

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| *1.Which season has the most rainfall? (comparative)* | *2. Do trees with bigger leaves lose their leaves in autumn? (pattern seeking)* | *3.Is the weather the same every day in (summer)? (observing over time)* | *4.How would you group these things based on which season you are most likely to see them in? (classifying)* | *5.* | *6.* |

**National Curriculum objectives:**

- Sc1/4.1a observe changes across the 4 seasons
- Sc1/4.1b observe and describe weather associated with the seasons and how day length varies.

**Links to prior learning:**
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. (Early Learning Goal).

**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.

**Links to future learning:**
-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)

**Key concept(s):**
The Earth is tilted and spines on its axis, leading to day and night, climate and the seasons.

**Vocabulary:**
*Consolidate:*
**energy, freezing, melting, orbit, reflection,** Sun, clouds, wind, snow, ice, spring, summer, autumn, winter

*New learning:*
humidity, cloudy, pouring, droplet, blizzard, shiver, clear

**<u>Core knowledge to teach and recall each lesson throughout the year</u>**

- **To know that we have 4 seasons in the UK**
- **To know that weather and nature changes across each season.**
- **To know that the seasons change as the earth moves around the sun.**
- **To know the earth takes a year to orbit the sun and in that year we will have 4 seasons.**
- **To know which season comes before / after another.**

**That days are longer in the summer and shorter in winter**
***In the UK, the day length is longest at mid-summer (about 16 hours) and gets shorter each day until mid-winter (about 8 hours) before getting longer again.***
**Know that weather changes through the year, getting hotter in the summer and colder in the winter**
**Know that weather causes other changes. In the UK, it is usually colder and rainier in winter, and hotter and dryer in the summer. The change in weather causes many other changes. Some examples are: numbers of minibeasts found outside; seed and plant growth; leaves on trees; and type of clothes worn by people.**
**Know that the Earth orbits the Sun with one orbit constituting a year of 365/366 days**

**Lesson 1 - Autumn (Autumn2)**

- **To know that autumn follows summer and comes before winter.**
- **To know that autumn begins at the end of September and is all of October, November and some of December.**
- **To recognise seasonal change in plants and animals such as deciduous trees start to lose their leaves, conkers and acorns fall from horse chestnut and oak trees, recognise seasonal fruit and vegetables (blackberries, apples, pears, pumpkins) animals such as hedgehogs, bats and dormice hibernate**

**during the autumn months.**

- **The days are getting shorter and the night longer throughout Autumn.**
- **The weather is getting colder as we move through the Autumn months.**
- **To know what type of clothes we would usually wear in the Autumn.**
- **Do trees with bigger leaves lose them in Autumn? Pattern seeking**

- ❖ Evergreen trees stay green in Autumn. Identify these trees e.g conifers, holly, pine.
- ❖ Recognise and identify berries that grow and understand they are a food source for birds and wildlife at this time of year.

**Lesson 2 -Winter (Spring 1)**

- **To know that winter follows autumn.**
- **To know that winter in the coldest season.**
- **To know that winter starts towards the end of December, all of January, February and some of March.**
- **The days are the shortest and nights the longest in winter.**
- **know that the winter is likely to bring ice on the ground when water freezes due to the cold.**
- **To recognise the seasonal change in plants and animals such as deciduous trees have no leaves, animals that hibernate are still in hibernation, very few plants have flowers.**
- **To know what type of clothes we wear in winter.**
- **There is a possibility of snow in the UK during winter but not always.**
- **That when the temperature drops to 0 degrees is when the ground / water freezes and ice occurs.**

- ❖ The shortest day of the year is in December, usually around 21st December.
- ❖ We need to keep the heating on in our homes to keep us warm
- ❖ When we have winter in the UK it is Summer in Australia and the other southern hemisphere countries.T
- ❖ The UK is too cold for some birds so they fly away to warmer countries, this is called migration (such as geese)..

**Lesson 3 - Spring (Spring 2 or Summer 1)**

- **To know that Spring follows winter and Summer comes next.**
- **To know that the weather gets warmer throughout the spring.**
- **To recognise spring has lots of rain and sunshine and that this is good for growing plants.**
- **To know that spring starts towards the end of March and lasts all of April, May and some of June.**
- **The days get longer and the nights get shorter throughout spring.**
- **To know what type of clothes we wear in spring.**
- **To know the temperature begins to rise as we move through spring.**

- **To recognise seasonal change of plants and animals that happens in the spring. Naming spring flowers (daffodil, bluebell, tulip) and that many animals have babies in the spring chicks, lambs, calves tend to hatch / be born in this season, frogs lay frogspawn and then it hatches into tadpoles. Animals that hibernate over the winter come out of hibernation in the spring.**

❖ **Spring starts when the day and night are the same length.**

**Lesson 4 - Summer (Summer 1 or 2)**

- **To know that summer comes after spring and before autumn.**
- **To know the weather is hottest in the summer months.**
- **The days are at their longest and nights at their shortest in the summer.**
- **To know that summer starts at the end of June, all of August and most of September.**
- **To know what type of clothes we wear in summer.**
- **To recognise that we tend to have holidays and go to the beach in the summer but the beach is still there at all times of year but is a pleasant experience during the summer months.**
- **To recognise seasonal change of plants and animals in summer. Naming summer flowers (sunflower, lavender, daisies) deciduous trees have leaves (evergreens are still green as they have been all year). Butterflies and bees are in abundance pollinating flowers.**

**Lesson 5 - Comparison/ recall of all seasons (Summer 2)**

- **To name all the seasons in order.**
- **To be able to compare the seasons e.g how is autumn different to summer / winter to spring etc…**
- **What season comes before____ and after _____**
- **What moths are in which seasons.**
- **What season is (month) in? What will the weather generally be like then.**
- **What would you notice is plants(trees specifically and animals in e.g April etc.. and how is that different to January.**
- **How would you group these things based on which season you are most likely to see them? Classifying**
- **Which season has the most rainfall? Analyse data conclude results.**
-

❖ Compare seasons by the axis of the earth in different months.
❖ Compare the seasons in different countries by which hemisphere of the earth they are in. Make opposite comparisons e.g Australia's summer is our winter. To know this is because those countries are on the other side of the world.
❖ To know countries close to the UK have more similar seasons to the UK.

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| | **Lesson 6 - Scientific enquiry**<br><br>● **Is the weather the same everyday in summer? Start to record the weather a few days a week (when noticeably changeable or extreme). Take notes on the temperature, sky conditions and rain over the end of June and beginning of July. Compare results and draw conclusions (observing over time).**<br>● **Is everyday the same? How? Why? What did you notice?** |

**Year 1: Plants (biology)**

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| *1.Are all plants the same? (grouping and classifying) visit and examine local trees over time* | *2. What parts are plants made from? (sources)* | *3.How could we sort the leaves that we collected on our walk? (identify and classify)* | *4.Where will a sunflower grow the tallest? (comparative)* | *5.Does my sunflower change every week? (observing over time)* | *6.Is there a pattern to where we find weeds growing in the school grounds? Find and examine their roots. (pattern seeking)* | *7.Examine the seeds in an apple* |

**National Curriculum objectives:**

. Sc1/2.1a identify and name a variety of common wild and garden plants, including deciduous and evergreen trees
. Sc1/2.1b identify and describe the basic structure of a variety of common flowering plants, including trees

**Links to prior learning:**
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. (Early Learning Goal)

**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.

**Links to 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)
-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)

**Key concept(s):**
Animals and plants are living things, they have similarities and differences.

**Vocabulary:**
*Consolidate:*
**energy, habitat**

*New learning:*
component, energy, growth, deciduous, evergreen, flower, plant, tree, structure, roots,

**Lesson 1 - Parts of a plant**

- **To know plants are living things.**
- **To know what constitutes a plant as a living thing.**
- **To name the roots, stem, petals, leaves, trunk (of trees). To identify these features of a plant in all types of plants.**
- **Know that plants have common parts, but they vary between the different types of plants.**
- **Know that flowering plants consist of roots, stem, leaves and flowers, and that a tree's stem is called a trunk.**
- **To know that flowers begin as a seed or a bulb.**
- **To recognise that the seeds / bulbs look different.**
- **Plant a sunflower seed - take photos to refer back to. Also plant 3 more to observe growth in different places - in sunlight / dark / partial sunlight.**

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| stem, leaf, trunk, flower, warmth, evergreen, deciduous, bud, leaf, branch, root, stem | ❖ To recognise a seed and bulb and match it to the grown plant e.g acorn -oak tree / cress seed - cress / daffodil bulb - daffodil etc..<br><br>**Lesson 2 - Classifying Plants**<br><br>● **To know plants are given specific names.**<br>● **We can name plants by observing their individual features.**<br>● **To name plants: a rose bush, a sunflower and a dandelion by sight. Compare common features and the flower / leaves that are individual to that flower.**<br>● **To know some plants are wild, some are garden and some are weeds.**<br>● **Observe any changes in the sunflower seeds.**<br><br>❖ To recognise where different plants grow well (conditions for growth).<br>❖ To name a range of garden / wild / weeds by sight.<br>❖ To relate knowledge of seasons to seasonal plants e.g tulips flower in the spring, roses flower in the summer.<br><br>**Lesson 3 - Parts of a tree**<br><br>● **Identify the parts of a tree (trunk, leaf, branch, root, bark, crown- where applicable blossom/needles)and name these parts.**<br>● **To know that a tree has a trunk and its function.**<br>● **To know some trees can live for hundreds of years under the correct growth conditions.**<br><br>❖<br><br>**Lesson 4 - Classifying Trees**<br><br>● **To recognise an oak tree, a birch tree, horse chestnut tree and pine tree by sight.**<br>● **Know some trees are deciduous and some are evergreens. To use and articulate these terms.**<br>● **To know we name trees by identifying their leaves. The shape of the leaf tells us the name of the tree.**<br>● **Identify trees by their leaf using a classification key.**<br><br>**Lesson 5 - Observing plants over time - conditions for growth**<br><br>● **To know plants are living things.**<br>● **To know that plants need the correct conditions for growth.** |

- **To know that plants need light, water and the correct temperature for that particular plant.**
- **Order the lifecycle of a sunflower.**
- **Make comparisons from the seed / seedling of the sunflower plant the children planted in week 1.**

**Lesson 6 - Investigation (pattern seeking)**

- **Is there a pattern to where we see weeds growing on our school grounds.**
- **How do the roots of weeds vary?**
- **Where have we found weeds grow?**

**Year 2: Ongoing throughout the year - working scientifically**

**National Curriculum objectives:**

. Sc2/1.1 asking simple questions and recognising that they can be answered in different ways
· Sc2/1.2 observing closely, using simple equipment
· Sc2/1.3 performing simple tests
· Sc2/1.4 identifying and classifying
· Sc2/1.5 using their observations and ideas to suggest answers to questions
. Sc2/1.6 gathering and recording data to help in answering questions

**Key concept(s):**
- Observing over time
- Pattern seeking
- Research using Secondary Sources - Identifying & classifying
- Comparative tests - Fair tests

**Vocabulary:**
*Consolidate:*
**properties**, observe, test, magnifying glass, object, record, equipment

*New learning:*

- Know that we can ask questions about the world and that when we observe the world to answer these questions, this is science
- Know that we can use magnifying glasses to observe objects closely
- Know that we can test our questions to see if they are true
- Know that objects can be identified or sorted into groups based on their observable properties
- Know that we can write down numbers and words or draw pictures to record what we find

**Year 2: Uses of Everyday Materials (chemistry)**

| | | | | | | |
|---|---|---|---|---|---|---|
| 1. *Can plastic be harmful to the environment?* | *2. Which material would be most suitable for a (bookshelf/leotard/curtain).* | *3.How are plastics made? (sources)* | *4.Which materials will let heat go through them, and which will not? (identifying and classifying)* | *5.* | *6.* | *7.* |

**National Curriculum objectives:**

Sc2/3.1a identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for different uses

**Links to prior 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: 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.

**Links to future learning:**
-Compare and group together different types 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)

**Key concept(s):**

M1. Materials are different and each material is useful for different jobs because of their properties

**Vocabulary:**
*Consolidate:*
**absorption, matter, property, atoms**

*New learning:*

<u>Consolidate</u>
Objects are made from materials such as wood, plastic, glass, metal, water, rock
Materials have properties such as being hard, soft, strong, weak, absorbent, heavy, light, solid, runny, smooth and rough; these descriptions denote the properties of a material
Matter (stuff) is made from tiny building bloc

**Lesson 1**

- **Recall the name and properties of materials (see year 1 materials unit and previous learning).**
- **To know matter (stuff) is made from tiny building blocks** and these are called 'atoms'.
- **To name properties of materials using scientific vocabulary - strong, hard, soft, transparent, waterproof, absorbent, shiny, dull, magnetic, non magnetic, flexible, rigid, some get hot (conductors) and some don't when exposed to heat (insulators).**

**Lesson 2**

| | |
|---|---|
| **conductor**, brick, paper, cardboard,, movement, suitability, stretch, twist, waterproof, deformation, flexible, rigid | ● **To know that materials are chosen for the task they will be used for.**<br>● **To research the use of plastic in our lives - what do we use it for, where do we see it? Is it all the same or different?**<br>● **To know the properties of materials and their use have been developed and researched by scientists over time to make our lives better. E.g the invention and development of plastic over time since it was first invented in the early 1900s (research).**<br><br>**Lesson 3**<br><br>● **To know plastic is a human made material.**<br>● **To know plastic is very widely used.**<br>● **To know plastic doesn't rot or decay.**<br>● **To know plastic is harmful to our environment.**<br>● To research the environmental issues with plastic - oceans (debates for / against plastic straws).<br><br>**Lesson 4**<br>● **To know that a material can be suitable for different purposes (e,g glass - windows, glasses you drink from, glasses to help with sight, bottles as they are commonly used and are easily recycled) etc..and an object can be made from different materials. To know that objects can be made from different materials based on their properties and their use e.g gloves - wolly to keep you warm, plastic to keep your hands dry, rubber to stop your hand getting hot and wet, fire resistant for fire fighters etc..**<br>● **To investigate which material would make the best….e.g curtain, bookshelf, swimming costume?**<br><br>**Lesson 5**<br>● **To know some objects are made using different materials to ensure they are fit for use. E.g Pan metal to conduct heat but have a plastic handle so you don't burn yourself and a glass lid to see the food and how it is cooking.**<br>● **To be able to sort materials based on their properties for use in different objects.**<br><br>**Lesson 6**<br>● **To know that scientists look very closely at materials.**<br>● **That they don't rely on the naked eye but use magnification to compare and contrast materials.**<br>● **To have experience of observing materials using magnifying glasses and microscopes, observing similarities and differences between materials - making comparisons.** |

**Year 2: Uses of Everyday Materials (chemistry - continued)**

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| *1.Does changing the material of the 'road' make the toy car slow down?* | *2. Using equipment to measure and gain numerical data from an investigation.* | *3.Research a significant scientist from history. Research the work by John Dunlop who invented the pneumatic tyre (tyre filled with air) and how it is still used today. How he used materials to develop the tyre.* | *4.* | *5.* | *6.* |

**National Curriculum objectives:**

· Sc2/3.1b compare how things move on different surfaces.

Sc2/3.1c find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching

**Links to prior 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) A material can be suitable for different purposes and an object can be made of different materials. (Y2 - Uses of Everyday Materials)

**Common Misconceptions**
Some children may think:

**Links to future learning:**
-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)

**Key concept(s):**

**Vocabulary:**
*Consolidate:*

Movement, **property,**

*New learning:*

suitability, reversible,

**Investigation unit - materials and their properties**

**Lesson 1**

- **To know that some materials can be changed easily and others can't.**
- **To know that some objects change by bending, squishing and squashing them. To identify examples of these (clay, plasticine, dough, sponges rubber)**

**Lesson 2**

- **To know that materials that change shape by stretching, squashing, twisted or bending.**
- **That some materials can retain their new shape or stay in their new shape (compare an elastic band that retains its shape and clay that can keep it's new shape).**

| | |
|---|---|
| squashing, twisting, stretching<br><br>Friction, surface | ● **To know when this process is used to make objects e.g a ceramic plate, mug etc..**<br><br>**Lesson 3**<br>● **To compare how a toy car travels on different surfaces.**<br>● **To know that the surface the car travels on will affect the speed the car travels at.**<br>● **To know how fast and slow a car travels on surfaces depends on friction.**<br><br>**Lesson 4**<br><br>● **To be able to plan a simple experiment conducting a fair test.**<br>● **To know what needs to change and what needs to stay the same.**<br>● **To know that we only change 1 variable at a time.**<br>● **To investigate the best surface for a car to travel on.**<br>● **To carry out an investigation and record numerical results using equipment to gain the data (measuring).**<br>● **To know that the surface with the most friction travels the shortest distance.**<br><br>**Lesson 5**<br>● **To use numerical data to display results.**<br>● **be able to make conclusions from numerical data.**<br>● To be able to interpret sets of data displayed in different ways e.g from tables and graphs. |

**Year 2: Living Things and their Habitats (biology)**

| 1. | 2. | 3. | 4. | 5. | 6. |
|---|---|---|---|---|---|
| *Is everything on Earth alive?* | *How would you group things to show which are living, dead or have never been alive? (classifying) What conditions do woodlice prefer to live in? (observing over time)* | *Which habitat do worms prefer – where can we find the most worms? (pattern seeking)* | *How does the habitat of the arctic compare to the habitat of the Rainforest? (using sources)* | | |

**National Curriculum objectives:**

. Sc2/2.1a explore and compare the differences between things that are living, dead, and things that have never been alive
. Sc2/2.1b 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
. Sc2/2.1c identify and name a variety of plants and animals in their habitats, including microhabitats

**Links to prior 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) 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)

**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.

**Links to future learning:**

-Recognise that living things can be grouped in a number 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)

**Key concept(s):**

All living things are interconnected in some way.

**Vocabulary:**

*Consolidate:*
**habitat**, **growth, absorption**, deciduous, evergreen, flower, plant, tree, structure, roots, stem, leaf, trunk, flower,

<u>Consolidate</u>

Dandelions, rose bushes, grass, ash trees, birch trees and conifers trees are examples of plants.
Trees can be deciduous or evergreen.
A trout is an example of fish, a frog is an example of an amphibian; a lizard is an example of a reptile; a robin is an example of a bird; a rabbit and a human are examples of a mammal
Herbivorous animals eats plants; a carnivorous animal eats other animals; omnivorous animals eat both animals and plants

herbivore, carnivore, omnivore

*New learning:*
**birth, decay, energy,** microhabitat, dead, life cycle, food chain, source, nutrients, reproduction, consumption, environment, suited, suitable, habitat, micro-habitat, shelter, feature, leaf litter

**Lesson 1 - What is a living thing / dead thing**

- **To recall what constitutes a living thing (needs to feed, grow and reproduce).**
- **To know all objects are either living, dead or have never been alive.**
- **Living things are plants (including seeds) and animals.**
- **To know that those dead things used to do these things, but no longer do; and that things that never lived have never done these things.**

**Lesson 2 - dead / never been alive**

- **To know that dead things include dead animals and plants and parts of plants and animals that are no longer attached e.g. leaves and twigs, shells, fur, hair and feathers (This is a simplification, but appropriate for Year 2 children.) An object made of wood is classed as dead.**
- **Objects made of rock, metal and plastic have never been alive (again ignoring that plastics are made of fossil fuels).**

**Lesson 3 - Habitats**

- **To know what a habitat is.**
- **To know that the habitat provides the basic needs of the animals and plants – shelter, food and water.**
- **That there are many different types of habitat - big/small, land/water, hot/cold.**
- **To know animals and plants live in a habitat to which they are suited, which means that animals have suitable features that help them move and find food and plants have suitable features that help them to grow well.**
- **To be able to name the habitats of different animals and know why it is a relevant environment for that animal. E.g fox in a den, frog in a pond.**

**Lesson 4 - Microhabitats**

- **To know that within habitats there are microhabitats ( a small scale specific habitat).**
- **Know that in micro-habitats e.g. in a woodland – in the leaf litter, on the bark of trees, on the leaves. These micro-habitats have different conditions e.g. light or dark, damp or dry. These conditions affect which plants and animals live there.**
- **Know that woodlice live under logs – an example of a microhabitat - as they need somewhere dark and damp so that they do not dry out**
- **Know that frogs can live in ponds – an example of a microhabitat - as they water in which to lay their eggs (frogspawn)**
- **To have 1st hand experience of observing animals in their own habitat (woodlice under logs, frogs in the pond, birds in the trees).**

**Lesson 5 - adaption**

- **To know that adaption is the process of change by which a species becomes better suited to its environment.**
- **Know that polar bears are an example of an animal adapted to its environment – thick fur for warmth and oily paw pads to ensure that they don't freeze to the ice.**
- **Know that sharks are another example – smooth skin and streamlined shape for quick swimming; and gills for breathing underwater**
- **Know that cacti are an example of a plant adapted to its environment – thick skin keeps a store of water safe; sharp spikes keep animals from stealing the water**
- **Know that pine trees have thick bark and pine cones to protect against cold winters**
- **To know that animals that cannot adapt to their environment and lose their habitat can become extinct.**
- **To know some species have become extinct (research which, why and when - e.g west african black rhinoceros)**

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**Year 2: Living Things and their Habitats (biology) (continued - short unit to make a headstart on large summer 1 unit- animals, including humans)**

| | | | | | |
|---|---|---|---|---|---|
| *1.Where do plants and animals get their energy?* | *2. How can we show where animals get their food from?/How does energy travel...?* | *3.* | *4.* | *5.* | *6.* |

**National Curriculum objectives:**

. Sc2/2.1d 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.

**Links to prior 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)

**Common Misconceptions**
Some children may think: plants and seeds are not alive as they cannot be seen to move; arrows in a food chain mean 'eats'.

**Links to future learning:**
-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)
-Construct and interpret a variety of food chains, identifying producers, predators and prey. (Y4 - Animals, including humans)
-Know that an ecosystem is a community of animals, plants, micro-organisms, non-living things and their shared environment. Know that ecosystems are interdependent and that energy passes through them.(Y6 geography - biomes)

**Key concept(s):**
NW2. All living things are interconnected in some way

**Vocabulary:**
*Consolidate:*
**habitat**, **growth, absorption**, herbivore, carnivore, omnivore

*New learning:*
**energy,** food chain, source, produce, consume

**Lesson 1**
- **Know that plants and animals get their food from different sources**
- **The plants and animals in a habitat depend on each other for food and shelter etc.**
- **Know that plants absorb energy from the Sun (through their leaves); that this energy is consumed by herbivorous animals; and that carnivorous animals eat other animals.**
- **That the order of consumption is called a food chain.**
- **Food chains are vital for survival.**

**Lesson 2**
- **To know a food chain shows how animals depend on other plants and animals for survival.**
- **To be able to use a food chain diagram.**
- **To know the arrows in a food chain show the order of consumption and therefore the direction that the energy travels.**

**Lesson 3**
- **To be able to create a food chain from research of which animal eats what and in which order.**
- **To know animals try to avoid being eaten (by hiding, camouflage and the speed that they attempt to flee) but some always will be eaten and some will 'escape'.**
- **To know habitats are based on the food chains of animals.**
- **That it is nature, a natural instinct for animals to behave in this way.**

**Lesson 4**
- **To be able to identify prey and predators on a food chain.**
- **To know carnivores will be at the top of the food chain and herbivores at the bottom.**

**Year 2: Plants (biology)**

| | | | | | |
|---|---|---|---|---|---|
| *1.What happens to my bean after I have planted it? (observing over time)* | *2. Do bigger seeds grow into bigger plants? (pattern seeking)* | *3.Do cress seeds grow quicker inside or outside? (comparative)* | *5.Do all plants have the same 'needs'?* | *6.What kind of plants grow in India? (research)* | |

**National Curriculum objectives:**

. Sc2/2.2a observe and describe how seeds and bulbs grow into mature plants
. Sc2/2.2b find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.

**Links to prior 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)

**Common Misconceptions**
Some children may think: plants are not alive as they cannot be seen to move; seeds are not alive; all plants start out as seeds; seeds and bulbs need sunlight to germinate.

**Links to future learning:**
-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)

**Key concept(s):**
NW1. Animals and plants are living things, they have similarities and differences.

**Vocabulary:**
*Consolidate:*
**growth, habitat,** nutrients, energy, survival

*New learning:*
bulb, seed, temperature, germinate, require, stunted, dormant, shade, condition, moist, produce

**Lesson 1**

- **Know that seeds and bulbs need to be buried underground in soil and that they will grow into adult plants under the right conditions (water, warmth)**
- **To know plants may grow from either seeds or bulbs.**
- **To plant a bean to observe over time.**

**Lesson 2**

- **Seeds and bulbs need to be planted outside at particular times of year and they will germinate and grow at different rates.**
- **These then germinate and grow into seedlings which then continue to grow into mature plants.**
- **To plant cress to observe conditions for growth in the next lesson.**

**Lesson 3**

- **To Know that plants that are deprived of light, food or air will not grow and will die.**
- **Plants also need different amounts of water and space to grow well and stay healthy.**
- **To know that plants need the correct conditions for growth to live and grow.**
- **To compare results when comparing the conditions for growing cress inside and outside. Which grew quicker?**
- **Some plants are better suited to growing in full sun and some grow better in partial or full shade.**

- **To know different plants have both varying and similar conditions e.g cactus can grow in hot dry conditions and so do palm trees, oak trees and bluebells live in similar conditions.**

**Lesson 4**

- **To know that mature plants may have flowers which then develop into seeds, berries, fruits etc.**
- **To recognise which berries and fruits are from which plants and what the flower looks like.**

**Lesson 5**

- ***What kind of plants grow in India? (research)***
- **What conditions would the weather in India provide plants?**
- **Which plants survive in this climate?**
- **What food do you eat on a daily basis that may have grown in India? (bananas, papaya, mangoes).**

| **Year 2: Animals including humans (biology)** | | | | | | |
|---|---|---|---|---|---|---|
| *1.How does a tadpole change over time? (observing over time)* | *2. Which offspring belongs to which animal? (classifying)* | *3.Why do we eat food? Do all foods do the same job?* | *4.Why is it important to wash our hands?* | *5. Which meal(s) are the healthiest? (research, comparative)* | | |

**National Curriculum objectives:**

. Sc2/2.3a notice that animals, including humans, have offspring which grow into adults
. Sc2/2.3b find out about and describe the basic needs of animals, including humans, for survival (water, food and air)
. Sc2/2.3c describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.

**Links to prior learning:**

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)

**Common Misconceptions**

Some children may think: all young are all born, all young hatch,

**Links to future learning:**

-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 process 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)

**Key concept(s):**
NW1. Animals and plants are living things, they have similarities and differences.

**Vocabulary:**
*Consolidate:*
**growth, habitat,** nutrients, consumption

*New learning:*
**reproduction,** offspring, adult, survival, hygiene, exercise, allergy, vitamins, portion, balanced, active, perspire, frogspawn, tadpole, germs, spread, flock, generation

**Lesson 1**

- **To Know that animals, including humans, have offspring which grow into adults. In humans and some animals, these offspring will be young, such as babies or kittens, that grow into adults.**
- **To identify and name adult and corresponding young from a range of animal species (some pets, wild/farm animals e.g rabbit / kitten, cow/calf, tiger/cub). Classifying.**
- **Know that in other animals, such as chickens or insects, there may be eggs laid that hatch to young or other stages which then grow to adults. Know that the young of some animals do not look like their parents e.g. tadpoles, caterpillars**

**Lesson 2**

- **Know that animals, including humans, need food, water and air to survive.**
- **Know the basic food groups: fruit and vegetables, carbohydrates, protein, dairy, fat and sugary foods.**
- **To be able to sort foods based on their food group.**

**Lesson 3**

- **Know that more than half of our diet should be made up of carbohydrates, fruit and vegetables.**
- **To know to be healthy we need to eat a balanced diet and what a balanced diet is.**
- **Know that fats and sugary foods should be eaten rarely and in small amounts.**
- ***Which meal(s) are the healthiest? (research, comparative)***

**Lesson 4**

- **To Know that humans are born and change into adults over time.**
- **To know humans need the right amounts and types of food and exercise to grow into healthy adults (strong and fit).**
- To know that exercise makes the heart (a muscle) strong and a strong heart is a healthy body.

**Lesson 5**

- **Know that keeping clean, including washing and brushing teeth, is an important part of preventing diseases and staying healthy.**
- **To know that illnesses can be related to poor personal hygiene by spreading germs.**
- *Why is it important to wash our hands? Glitter gel experiment & instructions (observing over time).*

**Year 3: Ongoing throughout the year - working scientifically**

**National Curriculum objectives:**

- Sc4/1.1 asking relevant questions and using different types of scientific enquiries to answer them
- Sc4/1.2 setting up simple practical enquiries, comparative and fair tests
- Sc4/1.3 making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- Sc4/1.4 gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- Sc4/1.5 recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- Sc4/1.6 reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- Sc4/1.7 using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- Sc4/1.8 identifying differences, similarities or changes related to simple scientific ideas and processes
- Sc4/1.9 using straightforward scientific evidence to answer questions or to support their findings.

**Key concept(s):**

- Observing over time
- Pattern seeking
- Research using Secondary Sources - Identifying & classifying
- Comparative tests - Fair tests

**Vocabulary:**

*Consolidate:*
**properties,** observe, test, magnifying glass, object, record, equipment

*New learning:*
prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis

<u>Consolidate</u>

Know that we can ask questions about the world and that when we observe the world to answer these questions, this is science
Know that we can use magnifying glasses to observe objects closely
Know that we can test our questions to see if they are true
Know that objects can be identified or sorted into groups based on their observable properties
Know that we can write down numbers and words or draw pictures to record what we find

<u>New learning</u>

Know that we can ask questions and answer them by setting up scientific enquiries
Know how to make relevant predictions that will be tested in a scientific enquiry
Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same
Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stopwatches
Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw a neat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table
Know – with structured guidance - how to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion
Know how to precis a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry
Know that scientific enquiries can suggest relationships, but that they do <u>not</u> prove whether a prediction is true
Know that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which conditions can vary even, and that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry
Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts (e.g. effect of changing sunlight on a plant – does this work with other plants / different types of light / etc)
Know that they can draw conclusions from the findings of other scientists
Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry

**Year 3: Light (physics) (Autumn Term)**

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| *1.* How have our ideas about light evolved through history? (researching - https://www.ogdentrust.com/assets/general/Research-cards_ideas-about-light.pdf and https://www.ogdentrust.c | *2. What/how can we see when we peek inside (the bear cave) with the window covered? (Phizzi Guide A - pattern seeking)* | *3.How does the sun produce light? (research)* | *4.Can shadows change shape? (pattern seeking) Why do shadows change during the day? (observing over time - phizzi guide E)* | *5.How does the distance between the shadow puppet and the screen affect the size of the shadow? (fair tests)* | *6.Which material is best for a set of blackout curtains? (comparative test - phizzi guide B)* | *7. Which torch is brightest? (comparative test - phizzi guide C)* | *8.Is it impossible to see round corners?/how does a periscope work? (phizzi guide D - pattern seeking)* | |

**National Curriculum objectives:**

. Sc3/4.1a recognise that they need light in order to see things and that dark is the absence of light
. Sc3/4.1b notice that light is reflected from surfaces
. Sc3/4.1c recognise that light from the Sun can be dangerous and that there are ways to protect their eyes
. Sc3/4.1d recognise that shadows are formed when the light from a light source is blocked by a solid object
. Sc3/4.1e find patterns in the way that the size of shadows change.

**Links to prior learning:**
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: we can still see even where there is an absence of any light; our eyes 'get used to' the dark; the moon and reflective surfaces are light sources; a transparent object is a light source; shadows contain details of the object, such as facial features on their own shadow; shadows result from objects giving off darkness.

**Links to future learning:**
-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)

**Key concept(s):**
E2. Light and sound travel in waves and reflect off objects.

**Vocabulary:**

**Know that a data logger can keep track of light levels and that this can be plotted on a graph to show how this changes over the course of a day**

*(NB: the Sun and the Moon are capitalized when being discussed in an astronomical context.)*

*1st half term is the light knowledge and understanding.*
**Lesson 1**

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| *Consolidate:* **absorption, energy, property, reflection**<br><br>*New learning:* **wave,** mirror, incident ray, image, beam,solid, opaque, transparent, object source, data logger, proximity, ultraviolet, concave, convex, emit, reflect, translucent | Know that the study of light is part of the discipline of physics - the study of the processes that shape our world and how we use it.<br><br>**Light sources:**<br>**Light comes from a source (not their eyes).**<br>**Know that some objects, for example, the sun, light bulbs and candles are sources of light.**<br>**Know that the Sun is a light source, but that the Moon is not and is merely reflecting light from the Sun.**<br>**Know that many light sources give off light and heat ( but not all and cold light sources can also be a light source - glow sticks / LED lights).**<br>**To be able to name light sources that are natural (lightning, glow worms, sun, stars, lava) and manmade light sources (torches, candles, bulbs, TVs etc..).**<br><br>Know that filaments in traditional bulbs heat up until they glow, giving off light and heat.<br>Know that the Sun gives off light and heat when hydrogen turns into helium<br>Know that light is a form of energy<br>Know that energy comes in different forms and can be neither created nor destroyed, only changed from one form to another<br>Know that fluorescent bulbs glow when electricity adds energy to a gas within the bulb<br><br>**Lesson 2**<br>**Darkness (***we have a dark den in school)*<br>**Know that dark is the absence of light. We cannot see anything in complete darkness.**<br>**Know that objects are easier to see if there is more light. Some surfaces reflect light.**<br>**Know that we need light to see things and that darkness is the absence of light.**<br>**Know that we see objects because our eyes can sense light.**<br><br>**Lesson 3**<br>**Reflection**<br>**Know that light travels in straight lines**<br>**Know that light is reflected when it travels from a light source and then 'bounces' off an object.**<br>**Know that everything that we can see is either a light source or something that is reflecting light from a light source into our eyes.**<br>**Know that objects are easier to see if there is more light. Some surfaces reflect light.**<br>**Know that objects are easier to see when there is less light if they are reflective.**<br><br>**Lesson 4**<br>**The Sun and sun safety**<br>**Know that sunglasses can protect eyes from sunlight but looking at the Sun directly – even with sunglasses – can damage the eyes.**<br>**The ultra violet light from the sun is the harmful rays**<br><br>**Lesson 5**<br>**Shadows**<br>**Know that opacity/transparency and reflectiveness are properties of a material. To be able to recognise these properties in materials and confidently use the vocabulary.** |

**Know that shadows are formed on a surface when an opaque or translucent object is between a light source and the surface, blocking some of the light**
**Know that light passes through transparent objects.**
**Know that as objects move towards a light source, the size of the shadow increases and as it moves away it decreases.**
**Know how to show the changing of shadow size by drawing a diagram with straight lines representing light.**

**Lesson 6**
**Research - how ideas on light have changed over time.**
**Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry.**
**To be able to research ideas of key scientists over time. Use research cards to investigate and discuss scientific ideas Light research cards**

*2nd half term - investigating light - scientific enquiry using Autumn 1 knowledge on light.*
**Lesson 7**
*What/how can we see when we peek inside (the bear cave) with the window covered? (Phizzi Guide A - pattern seeking) Experiment details bear cave lesson ( we have bear caves in school - do not need to make buckets).*
What do we see when there are no sources of light?
To know through investigation that a light source is needed to see things.
To prove that without light we cannot see things.
To compare how different sources of light affect how well we see an object.
To make own conclusions from observations.

**Lesson 8**

***Which material is best for a set of blackout curtains? (comparative test - phizzi guide B) link to teacher guide Ogden Light see experiment B***
**To use data loggers to collect readings of light intensity.**
**To use results to create a bar chart.**

**Lesson 9**
***Can shadows change shape? (pattern seeking)***
***Why do shadows change during the day? (observing over time - phizzi guide E) Sun shadows experiment teacher guides***
*(we have semi circle sun shadows kit in school)*

**Lesson 10**
*How does the distance between the shadow puppet and the screen affect the size of the shadow? (fair tests) F: Shadow investigation*

**Lesson 11**

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| | ***Is it impossible to see round corners?/how does a periscope work? (phizzi guide D - pattern seeking)*** ***Reflections teacher guide here***<br>**We have a class set of periscopes.**<br>**To be able to draw a scientific diagram using a ruler to draw straight lines to show light travels in straight lines.**<br>**To add directional arrows to these lines to show the direction of the light to the eye.** |

**Year 3: Forces and Magnetism (physics) Spring 1**

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| *1.Which materials are attracted to magnets/Are all metals attracted to magnets? (identifying and classifying)* | *2. Does the size and shape of a magnet affect its strength? (pattern seeking)* | *3.Which magnet is the strongest? (comparative test)* | *4.If we magnetise a pin, how long will it stay magnetised for? (observing over time)* | *5.(Phizzi Guide - magnetic racing game problem solving)* | *6.Which material would make the best shoe for climbing Mount Everest? (comparative https://www.ogdentrust.com/resources/phizzi-enquiry-slippy-shoes)* |

**National Curriculum objectives:**
- Sc3/4.2a compare how things move on different surfaces
- Sc3/4.2b notice that some forces need contact between 2 objects, but magnetic forces can act at a distance
- Sc3/4.2c observe how magnets attract or repel each other and attract some materials and not others
- Sc3/4.2d 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
- Sc3/4.2e describe magnets as having 2 poles
- Sc3/4.2f predict whether 2 magnets will attract or repel each other, depending on which poles are facing.

**Links to prior learning:**
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) That the Earth has a north and south pole (Y2 geography).

**Common Misconceptions**
Some children may think: the bigger the magnet the stronger it is; all metals are magnetic.

**Links to future learning:**
-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)

**Key concept(s):**
P1: The universe follows unbreakable rules that are all about forces, matter and energy.

P1. Changes in movement or an object require a net force acting upon it.

**Vocabulary:**
*Consolidate:*

<u>Consolidate</u>
Metal is a material from which objects can be made.
As objects move across a surface there is friction when they rub against each other and that sometimes this friction is larger or smaller.
Applying forces to objects can change their shape.
Know that the roughness of a material is an example of a property

**Lesson 1**

Know that the study of forces and magnetism is part of the discipline of physics - the study of the processes that shape our world and how we use it.
Know that a force can be thought of as a push or a pull.
Know that there are three types of contact force: impact forces (when two surfaces collide), frictional forces (when two surfaces are already in contact) and strain forces (when an elastic material is stretched or squashed).

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| **energy, matter, property, wave,** metal, material, surface, friction, force, stretch, squash, rough, smooth<br><br>*New learning:*<br>Accelerate, deccelerate, motion, magnetic, non-magnetic, pole, north, south, sliding friction, static friction, elastic, resist, attraction, repulsion, attract, repel, horse shoe / ring / bar / wand magnet. | **Lesson 2**<br>When an object moves on a surface, the texture of the surface and the object affect how it moves. It may help the object to move better or it may hinder its movement e.g. ice skater compared to walking on ice in normal shoes.<br>Know that objects move differently on rough and smooth surfaces; objects resist movement more on rough surfaces because there is higher friction as the object moves<br><br>**Lesson 3**<br>Know that accelerate means getting faster<br>Know that decelerate means slowing down<br>Know that the term motion means 'moving from one place to another<br>Know that a balanced force is when two forces are equal and there is no motion.<br><br>**Lesson 4**<br>Know that there are also non-contact forces that can act between objects without them touching and that magnetism is an example of a non-contact force<br>Know that a magnet is a piece of iron or other material which attracts some metals towards it<br>Know that the word attract means one object pulling another object towards it know that repel means one object pushing another object away from it<br>Know that some materials are magnetic, meaning that they are attracted to a magnet, while other materials are non-magnetic. Iron and nickel and other materials containing these, e.g. stainless steel, are magnetic.<br>Know that magnets have two poles called north and south<br>Know that like poles (south-south and north-north) of two magnets repel each other and that opposite poles of two magnets (north-south) attract each other<br>Know that there is a magnetic field around a magnet - this is the area around a magnet where the magnetic forces work - which is strongest at each pole<br>Know the benefits of magnetic materials (e.g. sorting through different types of metals, keeping fridge doors sealed).<br><br>**Lesson 5**<br>Know what a compass looks like<br>1. A compass is used to find which direction you are facing.<br>2. They were invented over 2000 years ago<br>3. It was often used by sailors and explorers in the past to help find their way<br>4. The thin metal pin inside is suspended so it can spin freely<br>5. The pin always points North (Recap the 8 points of the compass from Year 2)<br>6. Now people often use Global Positioning Systems (GPS) rather than a compass<br><br>**Lesson 6**<br>**To investigate which magnet is the strongest?**<br>**Lesson idea** |

**Year 3: Rocks and Fossils (chemistry) Spring 2**

| *1.How could we classify/ rank these different types of rocks?* | *2. Are all rocks made in the same way? (grouping and classifying using criteria)* | *3.How does tumbling change a rock over time? (observing over time)* | *4.Which soil absorbs the most water? (comparative)* | *5.How does adding different amounts of sand to soil affect the speed that water drains through it? (fair tests)* | *6.Who was Mary Anning and what did she discover? (research)* |
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**National Curriculum objectives:**

. Sc3/3.1a compare and group together different kinds of rocks on the basis of their appearance and simple physical properties
. Sc3/3.1b describe in simple terms how fossils are formed when things that have lived are trapped within rock
. Sc3/3.1c recognise that soils are made from rocks and organic matter.

**Links to prior 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) 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 a granite worktop, are; not rocks as they are no longer 'natural'; certain found artefacts, like old bits of pottery or coins, are fossils; a fossil is an actual piece of the extinct animal or plant; soil and compost are the same thing.

**Links to future learning:**

-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)

**Key concept(s):**

NW2c. Fossils are formed over millions of years and appear in certain rocks.

C2: The arrangement, movement and type of the building blocks of matter and the forces that hold them together or push them apart explain all the properties of matter (e.g. hot/cold, soft/hard, light/heavy, etc).

A free visit to support this unit of work can be booked at the Lapworth Museum (at Birmingham university).
In the past The Coppice has been able to borrow rock samples from Woodrush to support this unit of work.

**Lesson 1**

Know that the study of rocks is part of the discipline of chemistry- the study of matter, its properties and the way substances interact.
Know that rocks can be different shapes and sizes (stones, pebbles, boulders)
To know that rocks have been used by humans for millions of years from early tools and weapons through to construction materials for buildings.
Know that rock is a naturally occurring material.
Know that rocks can be hard or soft. They have different sizes of grain or crystal
Know that there are different types of rock e.g. sandstone, limestone, slate etc. which have different properties.

**Lesson 2**

Know that rocks can be hard or soft. They have different sizes of grain or crystal.

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| E3: The Earth is made up of several layers, including a relatively thin rocky surface which is divided into tectonic plates, and the movement of these plates leads to many geologic events (such as earthquakes and volcanoes) and geographical features (such as mountains.)<br><br>**Vocabulary:**<br>*Consolidate:*<br>**decay, matter**, **melting**, material<br><br>*New learning:*<br>**extinction,** igneous, metamorphic, sedimentary, paleontologist, weathering, molten rock, crust, tectonic plates, scavengers, fossil | Know that there are three kinds of rocks: igneous, sedimentary and metamorphic<br>Know that the Earth has a solid crust made up of tectonic plates with molten rock beneath<br>Know that granite and basalt are types of igneous rock and that igneous rocks form from molten rock below the Earth's crust<br>Know that limestone and sandstone are types of sedimentary rock which form when small, weathered fragments of rock or shell settle and stick together, often in layers<br>Know that marble and slate are types of metamorphic rock which form when rocks in Earth's crust get squashed and heated in processes such as when tectonic plates press against each other<br><br>**Lesson 3 - Fossils**<br>Know that fossils form when a plant or animal dies and is quickly covered with silt or mud so that it cannot be rotted by microbes or eaten by scavenging animals; in time layers of sediment build, squashing the mud and turning it to stone around the dead plant or animal; the materials in the body are replaced by minerals that flow in water through the rock, leaving a rock in the shape of the animal or plant that was once there<br><br>**Lesson 4/5**<br><br>Know that soil is made from tiny particles of rock broken down by the action of weather (weathering)<br>Know that soils are made up of pieces of ground down rock which may be mixed with plant and animal material (organic matter). The type of rock, size of rock pieces and the amount of organic matter affect the property of the soil.<br><br>Know different types of soil:<br>Sandy soil is pale coloured and has large particles. These create lots of small air gaps. Water drains through them easily so it usually feels dry.<br>Clay soil is usually sticky and has small particles. They contain very few air gaps and water does not drain through it easily.<br>Chalky soil is a light brown soil. Water drains through it quickly.<br>Peat does not contain any rock particles. It's made from very old decayed plants and is dark, crumbly and rich in nutrients.<br><br>Lesson 6<br>Who was Mary Anning? Research her work.<br>Information links: Mary Anning - She shells sea shells on the sea sore |

**Year 3: Plants (biology)**

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| *1.How does water get through a plant to where it is needed? What happens to celery when it's left in a cup of coloured water? (observing over time)* | *2. How does the length of the carnation stem affect how long it takes for the food colouring to dye the petals? (fair test)* | *3.Do all plants need the same conditions? (observing over time/comparative test e.g. with parsley and a cactus)* | *4.How (many different ways) do seeds disperse? (research)* | | |

**National Curriculum objectives:**
- Sc3/2.1a identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers
- Sc3/2.1b 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
- Sc3/2.1c investigate the way in which water is transported within plants
- Sc3/2.1d explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

**Links to prior 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)

**Common Misconceptions**
Some children may think: plants eat food; food comes from the soil via the roots; flowers are merely decorative rather than a vital part of the life cycle in reproduction; plants only need sunlight to keep them warm; roots suck in water which is then sucked up the stem.

**Links to future learning:**
-Describe the life process of reproduction in some plants and animals. (Y5Living 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)

**Key concept(s):**
1. Animals and plants are living things, they have similarities and differences.
2. All living things are interconnected in some way
2b. *Bodies* are complex systems that need to be taken care of

**Vocabulary:**
*Consolidate:*
**component, energy, growth, habitat, reproduction, decay,** bulb, seed, survival, temperature nutrients, consumption, deciduous, evergreen, flower, plant, tree, structure, roots, stem, leaf, trunk,

**Lesson 1**
**Consolidate previous learning:**
- **Evergreen trees maintain their leaves throughout the year and deciduous trees shed their leaves in autumn.**
- **Flowering plants consist of roots, stem, leaves and flowers, and that a tree's stem is called a trunk**
- **Living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things.**
- **Plants absorb energy from the Sun; that this energy is consumed by herbivorous animals; and that carnivorous animals eat other animals.**
- **Seeds and bulbs need to be buried underground in soil and that they will grow into adult plants under the right conditions (water, warmth)**
- **The arrows on a food chain show the direction that the energy travels.**
- **Plants that are deprived of light, food or air will not grow and will die.**

**Begin investigation over time (over this half term and keep revisiting) ALSO SEE LESSON 6**

- **Do all plants need the same conditions? (observing over time/comparative test e.g. with parsley and a cactus). Keep in the classroom and compare conditions.**

flower

*New learning:*
**extinction,** fruit, nectar, anther, ovary, ovule, petal, pollen, stigma, style, stamen, function, exchange, dispersal, fertilization, *fertilisation, transpiration*

**Lesson 2/3**

- **Know that studying plants is part of the discipline of biology - the study of living things and their vital processes.**
- **Know that different parts of plants have one or more functions (jobs).**
- **Know that the roots collect water and minerals from the soil, and hold the plant firmly in the ground.**
- **Know that the stem holds up the leaves so that they can gather light to make food and holds up the flowers so that they can receive pollen and disperse their fruits; know that the stem also transports water and minerals from the roots to the other parts of the plant.**
- **Know that the leaves make food by trapping light and using its energy to turn carbon dioxide and water into carbohydrates.**
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- That the process of plants making food is called photosynthesis.

**Lesson 4**

- **Know that the function of a flower is reproduction,**
- **Where flowers of the same kind exchange pollen – made by an anther – in a process called fertilisation, and a structure in the flower's ovary called an ovule becomes a seed; the ovary then becomes a fruit which helps the seed leave the plant in a process called dispersal.**
- **To be able to draw and label a scientific drawing of the flower.**
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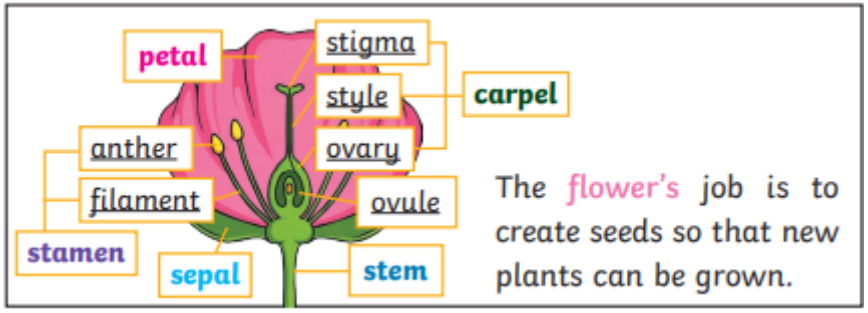


**Lesson 5**

- **To understand the variety of ways seeds are dispersed. Research.**
- **To looking for patterns in the structure of fruits that relate to how the seeds are dispersed.**

**Lesson 6 (may want to begin this experiment in earlier weeks so you have time to observe using this lesson to make and record conclusions).**

- **To investigate how water is transported in plants.**
- **To observe how water travels to flowers by putting white carnations / celery in different coloured water and observe over a few days / a week.**
- **Comparison - investigate different lengths of stem of carnations.**
- *Every stem, whether thick or thin, has tubes of xylem inside to transport water up through the plant.*

**Year 3: Animals including humans (biology)**

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| *1.How do our bodies move and stand? (researching)* | *2. How do the skeletons of different animals compare? (classifying)* | *3. What is the nutritional content of different (meals/cereals)?* | *4. What would constitute a balanced, high-nutrient diet?* | *5.How nutritious is my favourite fast food? (research)* | *6.How much sugar is in popular drinks? (both researching)* | | | |

**National Curriculum objectives:**

. Sc3/2.2a 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

. Sc3/2.2b identify that humans and some other animals have skeletons and muscles for support, protection and movement

**Links to prior 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)

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)

**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.

**Links to future learning:**

-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)

**Key concept(s):**

1. Animals and plants are

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| living things, they have similarities and differences.<br>2b. Bodies are complex systems that need to be taken care of<br><br>**Vocabulary:**<br><br>*Consolidate:*<br>**reproduction,** offspring, adult, vertebrate, skeleton, **growth**<br><br>*New learning:*<br>vitamin, balanced diet, cartilage, invertebrate, contract, loosen, ribcage, insect, exoskeleton | **Lesson 1**<br><u>Consolidate</u><br>Animals, including humans, need food, water and air to survive.<br>There are food groups: fruit and vegetables, carbohydrates, protein, dairy, fat and sugary foods.<br>More than half of our diet should be made up of carbohydrates, fruit and vegetables.<br>Fats and sugary foods should be eaten rarely and in small amounts.<br>● **Know that studying animals including humans is part of the discipline of biology - the study of living things and their vital processes.**<br>● **To know our bodies are complex systems that need to be taken care of.**<br>● **Know that proteins are good for growth, carbohydrates for energy and fruit and vegetables provide vitamins and minerals which help keep us healthy (e.g. calcium for healthy bones and teeth)**<br>● **Know that getting the right amount of each food group (including over half of the diet made up of fruit, vegetables and carbohydrates) is called a balanced diet**<br>●<br><br>**Lesson 2/3**<br>● **Know that lack of a nutrient can cause ill health; for example, a lack of vitamin D leads to a disease called rickets**<br>● **Know that excess of a food group can cause ill health, such as tooth decay due to excess sugar**<br>● ***<u>NB – some food groups are difficult to afford for some families so sensitivity is required in teaching this area</u>***<br>● **Know that excess fat from fatty foods such as butter and cheese - and created in the body from excess calories – builds up in the body and can cause obesity**<br>● **Know that excess body fat can lead to heart disease and increases the strain on joints and growing bones**<br>● *How much sugar is in popular drinks? Researching*<br><br>**Lesson 4 / 5**<br>● Know that animals, including humans, have a skeleton made up of solid objects.<br>● Know that skeletons provide support for muscles and protect the body; for example, the ribcage protects the vital organs in the human body<br>● Know that human skeletons are made up of bones and cartilage<br>● Know that muscles can only contract, so they must be arranged in pairs in the body so that as one contracts the other loosens<br>● Know that some animals (such as insects) have an exoskeleton – a solid covering on the outside of their body<br>● Know that many invertebrates (such as earthworms and slugs) have water held inside by muscles which act like a skeleton<br><br>**Lesson 6**<br>● *How do the skeletons of different animals compare? (classifying)* |

**Year 4: Ongoing throughout the year - working scientifically**

**National Curriculum objectives:**

- Sc4/1.1 asking relevant questions and using different types of scientific enquiries to answer them
- Sc4/1.2 setting up simple practical enquiries, comparative and fair tests
- Sc4/1.3 making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- Sc4/1.4 gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- Sc4/1.5 recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- Sc4/1.6 reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- Sc4/1.7 using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- Sc4/1.8 identifying differences, similarities or changes related to simple scientific ideas and processes
- Sc4/1.9 using straightforward scientific evidence to answer questions or to support their findings.

**Key concept(s):**

- Observing over time
- Pattern seeking
- Research using Secondary Sources - Identifying & classifying
- Comparative tests - Fair tests

**Vocabulary:**

*Consolidate:*
**properties,** observe, test, magnifying glass, object, record, equipment

*New learning:*
prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis

<u>Consolidate:</u>

Know that we can ask questions about the world and that when we observe the world to answer these questions, this is science
Know that we can use magnifying glasses to observe objects closely
Know that we can test our questions to see if they are true
Know that objects can be identified or sorted into groups based on their observable properties
Know that we can write down numbers and words or draw pictures to record what we find

<u>New learning and vocabulary – ongoing from year 3</u>

Know that we can ask questions and answer them by setting up scientific enquiries
Know how to make relevant predictions that will be tested in a scientific enquiry
Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same
Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stopwatches
Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw a neat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table
Know how – with structured guidance - to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion
Know how to precis a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry
Know that scientific enquiries can suggest relationships, but that they do <u>not</u> prove whether a prediction is true
Know that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which conditions can vary even, and that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry
Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts (e.g. effect of changing sunlight on a plant – does this work with other plants / different types of light / etc)
Know that they can draw conclusions from the findings of other scientists
Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry

**Year 4: States of Matter (Chemistry)**

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| *1.Is it always easy to tell the difference between solids, liquids and gases? (classifying).* | *2. Does water always melt at the same speed? (comparative)* | *3.How does the level of water in a glass change when left on the windowsill? (observing over time)* | *4.Is there a pattern in how long it takes different sized ice lollies to melt? (pattern seeking)* | *5.Do all liquids freeze at the same temperature? (comparative tests)* | *6.What is the water cycle and how does it work? (research)* | |

**National Curriculum objectives:**

. Sc4/3.1a compare and group materials together, according to whether they are solids, liquids or gases
. Sc4/3.1b 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)
. Sc4/3.1c identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

**Links to prior 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)
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)

**Common Misconceptions**

Some children may think: 'solid' is another word for hard or opaque; solids are hard and cannot break or change shape easily and are often in one piece; substances made of very small particles like sugar or sand cannot be solids; particles in liquids are further apart than in solids and they take up more space; when air is pumped into balloons, they become lighter; water in different forms – steam, water, ice – are all different substances; all liquids boil at the same temperature as water (100 degrees); melting, as a change of state, is the same as dissolving; steam is visible water vapour (only the condensing water droplets can be seen) clouds are made of water vapour or steam; the substance on windows etc. is condensation rather than water; the changing states of water (illustrated by the water cycle) are irreversible; evaporating or boiling water makes it vanish;

**Links to future learning:**

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

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| evaporation is when the Sun sucks up the water, or when water is absorbed into a surface/material. | |

**Key concept(s):**
M2. All matter is in the solid, liquid or fast state at room temperature but may change state if warmed or cooled.

**Vocabulary:**
*Consolidate:*
**absorption, dissolving, energy, freezing, matter, melting, particle**, temperature, ice, water, solid

*New learning:*
**bond, condensation, evaporation, reversible,** boiling point, melting point, liquid, gas, grains, thermometer, water cycle, continuous precipitation, transpiration, surface runoff process, sublimation

Consolidate
An object is made from/of a material
Materials can be hard, soft, strong, weak, absorbent, heavy, light, solid and runny, smooth and rough; these descriptions denote the properties of a material
Know that matter (stuff) is made from tiny building blocks

**Lesson 1**
**Know that the study of changes of state is part of the discipline of chemistry- the study of matter, its properties and the way substances interact.**
**Know that things are composed of a material in one of three states of matter: solid, liquid or gas**
**Know that things are made of particles (tiny building blocks) and that these are organized differently in different states**
**Know that materials can change state when temperature changes**

**Lesson 2**
**Know that there are bonds between the particles (building blocks) in a solid; as temperature increases, these bonds are somewhat overcome as the particles absorb energy and solids can change into liquids; with a further increase in temperature, the particles become even more energetic and the bonds are overcome entirely so the liquid changes into a gas**
**Know that a solid keeps its shape and has a fixed volume.**
**Know that a liquid has a fixed volume but changes in shape to fit the container.**
**Know that a liquid can be poured and keeps a level, horizontal surface.**
**Know that granular and powdery solids like sand can be confused with liquids because they can be poured, but when poured they form a heap and they do not keep a level surface when tipped. Each individual grain demonstrates the properties of a solid.**
**Know that a gas fills all available space; it has no fixed shape or volume.**

**Lesson 3**
**Know that when solids turn into liquids, this is called melting and that the reverse process is called freezing**
**Know that the freezing point of water is 0°C. The boiling point of water is 100°C.**
**Know that when liquids turn into gases, this is called evaporation and that the reverse process is called condensation (change from a liquid to a gas caused by cooling)**
**Know that the melting point of water is 0° C and that the boiling point of water is 100° C. Boiling is a change of state from liquid to gas that happens when a liquid is heated to a specific temperature and bubbles of the gas can be seen in the liquid.**

**Lesson 4**
**Know that evaporation is the same state change as boiling (liquid to gas), but it happens slowly at lower temperatures and only at the surface of the liquid.**
**Know that evaporation happens more quickly if the temperature is higher, the liquid is spread out or it is windy.**

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| | **Lesson 5**<br>**Know that when a solid turns into a gas without passing through the liquid state, this is called sublimation**<br>**Know that water flows around our world in a continuous process called the water cycle**<br>**Know that, along with evaporation, water on the Earth's surface moves to the air in a process called transpiration in which water turns into water vapour (gas) on the surface of leaves on plants**<br><br>**Lesson 6**<br>**Know that rain condenses in clouds and falls to earth as rain, snow or hail in a process called precipitation**<br>**Know that water flows across the land in rivers and streams in a process called surface run-off and under the ground as groundwater**<br>**Know that the processes described as above are described as the water cycle.**<br>**Research into the water cycle.** |

**Year 4: Living Things and their Habitats (classification) (biology)**

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| *1.Are some animals more alike than others? (classifying - must be increasingly sophisticated from y2)* | *2. How can we use classification keys to identify the animals (we caught pond dipping)? (classification)* | *3.Which animals can survive (at the poles/on mountains) and why? (research)* | *4.Where in our school/community is the most polluted? (pattern seeking)* | *5.What are the causes and effects of environmental change? (research)* | *6.Does the amount of light affect how many woodlice move around? (fair test)* |

**National Curriculum objectives:**

- Sc4/2.1a recognise that living things can be grouped in a variety of ways
- Sc4/2.1b explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment
- Sc4/2.1c recognise that environments can change and that this can sometimes pose dangers to living things

**Links to prior 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)
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 a food chain or web has no or limited consequences on the rest of the chain; there is always plenty of food for wild animals; animals are only land-living creatures; animals and plants can adapt to their habitats, however they change; all changes to habitats are negative.

**Links to future learning:**

-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)

**Key concept(s):**

NW2. All living things are connected in some way.

**Vocabulary:**

*Consolidate:*
**decay, energy, habitat**, **freezing** plant, structure, herbivore, carnivore, omnivore, microhabitat, environment, reproduction, vertebrate

Consolidate

Living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things.
Polar bears are an example of an animal adapted to its environment – thick fur for warmth and oily paw pads to ensure that they don't freeze to the ice.
A trout is an example of fish, a frog is an example of an amphibian; a lizard is an example of a reptile; a robin is an example of a bird; a rabbit and a human are examples of a mammal
Herbivorous animals eats plants; a carnivorous animal eats other animals; omnivorous animals eat both animals and plants
A cat is an example of a carnivore; that a rabbit is an example of a herbivore; know that many humans are examples of omnivores (though not vegetarians)
Fish, amphibians, reptiles, birds and mammals are similar in that they have internal skeletons and organs; these are known as vertebrates, which means they are animals that have a backbone
Fish are different in having gills so that they can breathe underwater **and** have scaly skin
Amphibians are different in that they begin their lives with gills but then develop lungs and breath on land

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| *New learning:*<br>kingdom, classification key, species, fungi, bacteria, climate change, characteristics, offspring, extinction, pollution, habitat, ecology, bacteria, reintroduce, emission, pesticide complacent, woodland, ecosystem interdependent | Reptiles are different in that they breath air **and** have scaly skin<br>Birds are different to other animals in that they have feathers and wings<br>Mammals are different to other animals in that they have fur/hair **and** they feed milk to their young<br>Know a rose bush, grass, dandelion by sight<br>Know an ash tree, birch tree and conifer tree by sight<br><br>**Lesson 1**<br>**Know that studying living things and their habitats is part of the discipline of biology - the study of living things and their vital processes.**<br>**Know that animals can be grouped based on their physical characteristics (e.g. vertebrates and invertebrates) and based on their behavior (e.g. herbivores, carnivores and omnivores)**<br>**Know that animals can be divided into two main groups: those that have backbones (vertebrates); and those that do not (invertebrates).**<br>**Know that vertebrates can be divided into five small groups: fish; amphibians; reptiles; birds; and mammals. Each group has common characteristics.**<br>**Know that invertebrates can be divided into a number of groups, including insects, spiders, snails and worms.**<br><br>**Lesson 2**<br>**Know that hibernation and migration are examples of behavioural adaptations and examples of animals that hibernate / migrate.**<br><br>**Lesson 3**<br>**Know that living things are divided into kingdoms: the animal kingdom, plants, fungi, bacteria, and single-celled organisms**<br>**Know that a species is a group of living things have many similarities that can reproduce together produce offspring**<br><br>**Lesson 4**<br>**Know that a classification key uses questions to sort and identify different living things**<br>**Know how to use a classification key to identify living things**<br>**Know that plants can be divided broadly into two main groups: flowering plants; and non-flowering plants.**<br>**Know how to create a classification key to sort plants on the school premises**<br>**Know that an ecosystem is a community of living organisms and the nonliving components of their environment**<br><br>**Lesson 5**<br>**Know that changes to the environment can make it more difficult for animals to survive and reproduce; in extreme cases this leads to extinction, where an entire species dies**<br>**Know that environments may change naturally (e.g. through flooding, fire, earthquakes etc.) or through human activity. This can be in a positive human impact (such as setting up nature reserves) or a negative human impact, (such as littering).**<br><br>**Lesson 6**<br>**Know that the polar bear is a famous example of climate change endangering the existence of a species; as the climate changes and gets warmer, the sea ice on which polar bears live reduces in amount making it harder for them to survive and reproduce**<br>**These environments also change with the seasons; different living things can be found in a habitat at different times of the year (migration).** |

**Year 4: Animals Including Humans (Teeth, Digestion and Food Chains) (biology)**

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| *1.Are all of our teeth the same? Do they do the same job? (classification)* | *2. How can we know things about a dinosaur when they have been extinct for 65 million years? (research; classification/ grouping using teeth)* | *3.What happens to an (egg shell) when it's left in cola? (observing over time)* | *4.How do dentists fix broken teeth? (research)* | *5.Our food gives us energy* | *6.* |

**National Curriculum objectives:**

. Sc4/2.2a describe the simple functions of the basic parts of the digestive system in humans
. Sc4/2.2b identify the different types of teeth in humans and their simple functions
. Sc4/2.2c construct and interpret a variety of food chains, identifying producers, predators and prey.

**Links to prior learning:**

- 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 'eats'; the death of one of the parts of a food chain or web has no, or limited, consequences on the rest of the chain; there is always plenty of food for wild animals; your stomach is where your belly button is; food is digested only in the stomach; when you have a meal, your food goes down one tube and your drink down another; the food you eat becomes "poo" and the drink becomes "wee".

**Links to future learning:**

-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, 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)

**Key concept(s):**

1. Animals and plants are living things, they have similarities and differences.
2b. Bodies are complex systems that need to be taken care of.

**Vocabulary:**

<u>Consolidate</u>

Know that studying animals including humans is part of the discipline of biology - the study of living things and their vital processes.
Proteins are good for growth, carbohydrates for energy and fruit and vegetables provide vitamins and minerals which help keep us healthy (e.g. calcium for healthy bones and teeth)
A food group can cause ill health, such as tooth decay due to excess sugar
Living things move, grow, consume nutrients and reproduce
Plants absorb energy from the Sun; that this energy is consumed by herbivorous animals; and that carnivorous animals eat other animals.

**Lesson 1**

Know that humans have four types of teeth: incisors for cutting; canines for tearing; and molars and premolars for grinding (chewing).

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| *Consolidate:*<br>**absorption, component, energy,** nutrients, consumption, hygiene, herbivore, carnivore, organ<br><br>*New learning:*<br>Incisors, canines, molars, premolars, erosion, plaque, enamel, **dissolving,** digestion, excretion, peristalsis, anus, duodenum, small intestine, large intestine, stomach, rectum, esophagus, tongue, saliva, acid, bile, enzymes, predator, prey, producer, consumer, primary, secondary, tertiary | Know that teeth can be damaged by erosion and this can mainly be caused by diet (such as excessively eating acidic or sugary foods) as well as some other factors (e.g. teeth grinding, poor brushing) (Dentist into 'interview' research how do they fix a broken tooth?).<br>Know that a human has three types of teeth – incisors, canines and molars – and that these each perform different functions<br>Know that incisors slice food, canines tear food (especially meat) and that molars grind food<br>Know that children develop an initial set of teeth which are gradually replaced between the ages of 6 and 12<br><br>**Lesson 2**<br>Know that food passes through the body with the nutrients being extracted and the waste products excreted, and that this process is called digestion<br>Know that the process of digestion involves breaking complex foodstuffs into simpler building blocks that can be absorbed by the body<br>Know that the process of digestion begins with food being chewed in the mouth by the teeth and saliva added<br><br>**Lesson 3**<br>Know that the stomach releases acid and enzymes to continue breaking down the food; the stomach is an organ that churns food and adds chemicals called enzymes;<br>Know that an organ is a part of living thing that is self-contained and has a specific important job<br>Know that further enzymes and bile break down the food further as it moves through the duodenum towards the small intestine<br>Know that the small intestine adds more enzymes and then absorbs the nutrients<br>Know that the large intestine absorbs water from the undigested food<br>Know that undigested food is stored in the rectum before being excreted through a muscle called the anus<br><br>**Lesson 4/5**<br>Know that a food chain traces the path of energy through a habitat<br>Know that all energy for a food chain initially comes from the Sun which is absorbed and turned into energy by plants which are called producers<br>Know that consumers take in energy by eating<br>Know that an animal that is eaten by another is called prey, and that an animal that eats other animals is called a predator<br>Know that the first consumer in a food chain is called a primary consumer, the second is called a secondary consumer and above it is called a tertiary consumer<br>Know that the arrows in a food chain show the direction that energy is travelling through a habitat |

**Year 4: Electricity (Physics)**

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| *1.Does electricity flow easily through all materials/objects? (pattern seeking/classification)* | *2. How would you group these electrical devices based on where the electricity comes from? (classifying)* | *3.Which material is the best conductor of electricity? (comparative)* | *4.How does the thickness of a conducting material affect how bright the lamp is? (fair test)* | *5.How long does a battery light a torch for? (observing over time)* | |

**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.

**Links to prior learning:**
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. (Early Learning Goal)
Know that materials can have useful properties for a given job (including being waterproof, strong, hard, soft, flexible, rigid, light or heavy.) (Year 2 Materials)

**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.

**Links to future learning:**
-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)

**Key concept(s):**
E1. Electricity can only flow in a complete circuit.

**Vocabulary:**
*Consolidate:*
**component, conductor, energy, insulator, particle, property,** material

*New learning:*
**circuit,** appliance, charge, electron, battery, cell, bulb, buzzer, switch, wire, current electricity, static electricity, negative terminal, positive

<u>Consolidate</u>
An object is made from/of a material
Metal is a material from which objects can be made.
Matter (stuff) is made from tiny building blocks
**Energy comes in different forms and can be neither created nor destroyed, only changed from one form to another (very important knowledge must make sure the children know this).**

Lesson 1
Know that the study of electricity is part of the discipline of physics - the study of the processes that shape our world and how we use it.
Know that electrical energy is one of many forms of energy
Know that static electricity is an imbalance of charged particles on a material; it does <u>not</u> operate by flowing around a complete circuit
Know that current electricity is the flow of charged particles called electrons around a circuit
Know that wires – which contain a conductor inside them, usually made of metal – can allow electrical current to flow around a circuit
*How would you group electrical devices based on where the electricity comes from? (classifying)*

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| terminal, chemical reaction, emit | Lesson 2<br>Know that electrical current flows well through some materials, called electrical conductors, and poorly through other materials, called electrical insulators<br>Know that conductors have free electrons and that when electrical current flows around a conductor the electrons move<br>Know that electrical conductivity (how well a material conducts electricity) is an example of a property<br>Know that metals are good electrical conductors<br>Non-metallic solids are insulators except for graphite (pencil lead). Water, if not completely pure, also conducts electricity.<br><br>Lesson 3<br>Many household devices and appliances run on electricity. Some plug in to the mains and others run on batteries.<br>An electrical circuit consists of a cell or battery connected to a component using wires.<br><br>Know that exposure to high levels of electrical current can be dangerous<br><br>Lesson 4<br>Know how to construct a simple circuit using components<br>Know that a switch functions by completing or breaking a complete circuit to turn a component off/on.<br>If there is a break in the circuit, a loose connection or a short circuit, the component will not work.<br><br>Lesson 5<br>Know that when electrical current flows through a circuit components within that circuit – such as buzzers which make a noise and bulbs which emit light – begin to work<br><br>Lesson 6<br>*How have electrical inventions changed over time? Timeline card sort (research - see Ogden resources)* *Research cards here* |

**Year 4: Sound (physics)**

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| *1.How do instruments make different sounds? (identify and classify)* | *2. Which time of day is our classroom quietest? (observing over time)* | *3.How does the volume of a drum change as you move further away from it? (fair test)* | *4.How can we prove that sound travels through water? Does it travel the same way/speed? (pattern seeking - make a hydrophone from Ogden)* | *5.How does the length of a guitar string/tuning fork affect the pitch of the sound? (fair tests)* | *6.How do our ears work? (research)* | *7.Which material is best for muffling sound in ear defenders? (comparative)* | *8.* |

**National Curriculum objectives:**

. Sc4/4.1a identify how sounds are made, associating some of them with something vibrating
. Sc4/4.1b recognise that vibrations from sounds travel through a medium to the ear
. Sc4/4.1c find patterns between the pitch of a sound and features of the object that produced it
. Sc4/4.1d find patterns between the volume of a sound and the strength of the vibrations that produced it.
. Sc4/4.1e recognise that sounds get fainter as the distance from the sound source increases

**Links to prior learning:**

- 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: 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.

**Links to future learning:**

-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 (Hz); 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 loud speakers, 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 ultra-sound. (KS3)
-Waves transferring information for conversion to electrical signals by microphone. (KS3)

**Key concept(s):**
E2. Light and sound travel in waves and reflect off objects.

**Vocabulary:**
*Consolidate:*
**absorption, conductor, energy, wave**

*New learning:*

Consolidate

**Energy comes in different forms and can be neither created nor destroyed, only changed from one form to another (revisit from electricity).**

New learning

Lesson 1

Know that the study of sound is part of the discipline of physics - the study of the processes that shape our world and how we use it.
Know that sound is generated when an object vibrates; some of the energy from the vibrating object is transferred to the air, making the air particles move
**Know that energy comes in different forms and can be neither created nor destroyed, only changed from one form to another**
Know that sound is a form of energy that transfers in a longitudinal wave - like that seen in a slinky - ***not*** a transverse wave - like that seen in water ripples

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| **insulator, particle,** vibration, percussion instrument, wind instrument, string instrument, frequency, volume, pitch, transverse wave, longitudinal wave, medium, vacuum, eardrum, decibel, distorted, muffle vibration, vocal chords, nerves, cochlea | Know that sound travels through different mediums like solids, liquids and gases (e.g. particles in the air) and thus sounds does <u>not</u> travel through a vacuum which has no particles in it at all<br><br>Lesson 2<br>Know that longitudinal sound waves are detected in the ear by humans and that the brain interprets this as the sounds we hear<br>Know that sound travels at different speeds through different objects; it travels at around 340 metres per second in air, much slower than light travels; this is why we often hear thunder <u>after</u> we see lightning as the light reaches our eye before the sound reaches our ears<br>Know that sound travels faster through liquids than gases, but it travels fastest in solids<br>Know that sound vibrations cause parts of our body inside our ears to vibrate, allowing us to hear (sense) the sound.<br><br>Lesson 3<br>Know that pitch is how high or low a sound is and that this is determined by how many vibrations per second are being made by the vibrating object; the number of vibrations per second is called frequency<br>Know that volume is how loud or quiet a sound is and that this is determined by the amount of energy in the wave (e.g. from how hard or soft a percussion instrument is hit)<br>Know that the volume of a sound is quieter if the listener is further away from the object because the the strength (size) of vibrations decreases as you move further from the source<br>*.How does the volume of a drum change as you move further away from it? (fair test)*<br><br>Lesson 4<br>*How do our ears work? (research)*<br><br>Know that aging and exposure to loud noise can cause wear and tear to the inner ear, resulting in hearing loss.<br>Know that a sound insulator is a material which blocks sound effectively.<br>*Which material is best for muffling sound in ear defenders?*<br><br>Lesson 5<br>*How has our understanding of sound changed over time? (researching - Ogden)* |

**Year 5: Ongoing throughout the year - working scientifically**

**National Curriculum objectives:**

Sc5/1.1 planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
Sc5/1.2 taking measurements, using a range of scientific equipment, with increasing accuracy and precision
Sc5/1.3 recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, and bar and line graphs
Sc5/1.4 using test results to make predictions to set up further comparative and fair tests
Sc5/1.5 reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of results, in oral and written forms such as displays and other presentations

**Key concept(s):**
- Observing over time
- Pattern seeking
- Research using Secondary Sources - Identifying & classifying
- Comparative tests - Fair tests

**Vocabulary:**
*Consolidate:*
prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis

<u>Consolidate</u>
Know that we can ask questions and answer them by setting up scientific enquiries
Know how to make relevant predictions that will be tested in a scientific enquiry
Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same
Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stopwatches
Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw a neat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table
Know – with structured guidance - how to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion
Know how to precis a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry
Know that scientific enquiries can suggest relationships, but that they do <u>not</u> prove whether a prediction is true
Know that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which conditions can vary even, and that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry
Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts (e.g. effect of changing sunlight on a plant – does this work with other plants / different types of light / etc)

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| *New learning:*<br>line graph, relationship, outlier | Know that they can draw conclusions from the findings of other scientists<br>Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry<br><br><u>New learning</u><br>Know how to choose appropriate variables to test a hypothesis (e.g. plant height as a dependent variable when measuring effect of light on plant growth)<br>Know how to identify conditions that were imperfectly controlled and can explain how these might affect results<br>Know how to accurately use further measuring devices, including digital and analogue scales, measuring cylinders and beakers, recognizing the relative accuracy of each device<br>Know how and when to repeat measurements, how to find an average of a set of measurements and how to recognize and remove outliers from a set of data, justifying the removal as a potential mis-measurement<br>Know how to independently write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion<br>Know how to present brief oral findings from an enquiry, speaking clearly and with confidence and using notes where necessary<br>Know examples of instances where scientific evidence has been used to support or refute ideas or arguments (e.g. fossil records as evidence of natural selection) |

**Year 5: Properties and Changes of Materials (chemistry)**

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| 1. *How does the temperature of a cup of tea affect the length of time it takes a sugar cube to dissolve? (fair test)* | | | | *5.* | *6.How does a container of saltwater change over time?* | |

**National Curriculum objectives:**

Sc5/3.1a 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

Sc5/3.1b know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution

Sc5/3.1c use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating

Sc5/3.1d give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic

Sc5/3.1e demonstrate that dissolving, mixing and changes of state are reversible changes

Sc5/3.1f 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.

**Links to prior learning:**

- 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 materials together, according to whether they are solids, liquids or gases. (Y4 - States of matter)
- Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). (Y4 - States of matter)
- Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. (Y4 - States of matter)

**Common Misconceptions**

Some children may think:

**Lots** of misconceptions exist around reversible and irreversible changes, including around the permanence or impermanence of the change. There is confusion

**Links to future learning:**

-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)

between physical/chemical changes and reversible and irreversible changes. They do not correlate simply. Chemical changes result in a new material being formed. These are mostly irreversible. Physical changes are often reversible but may be permanent. These do not result in new materials e.g. cutting a loaf of bread. It is still bread, but it is no longer a loaf. The shape, but not the material, has been changed.

Be aware that pupils sometimes compare objects and not properties.
Also, sometimes children confuse the following properties:

Tough and hard – a diamond is very hard, but if hit with a hammer it will shatter because it's brittle.
Tough and strong – polythene doesn't break when dropped, but is not strong as it's easy to tear apart.

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; that all liquids contain water. In fact, liquids like nail varnish remover and cooking oil are non-polar; water is polar.

**Key concept(s):**
M1. Materials are different and each material is useful for different jobs because of their properties .
M2. All matter is in the solid, liquid or fast state at room temperature but may change state if warmed or cooled.

**Vocabulary:**
*Consolidate:*
**absorption, bond, condensation, conductor**, **evaporation, matter, melting, particle, property, reversible,** freezing, wood, plastic, glass, metal, water, rock, suitability, surface, waterproof, flexible,

<u>Consolidate</u>
One can distinguish between materials made of wood, plastic, glass, metal, water, rock
An object is made from/of a material
Materials can have useful properties for a given job (including being waterproof, strong, weak, hard, soft, flexible, rigid, solid, runny, light, heavy, smooth, rough, flexible or rigid.)
Magnetism and electrical conductivity (how well a material conducts electricity) are examples of a property
Metals are good electrical conductors
Many types of plastic are waterproof, that steel (a type of metal) is strong, that rock is hard, that cotton wool is soft, that rubber is flexible, that rock is rigid, that polystyrene (a type of plastic) is light and that iron (a type of metal) is heavy,
Things are composed of a material in one of three states of matter: solid, liquid or gas
Things are made of particles (tiny building blocks) and that these are organized differently in each state
Materials can change state when temperature changes
There are bonds between the particles (building blocks) in a solid; as temperature increases, these bonds are somewhat overcome as the particles absorb energy and solids can change into liquids; with a further increase in temperature, the particles become even more energetic and the bonds are overcome entirely so the liquid changes into a gas
When solids turn into liquids, this is called melting and that the reverse process is called freezing
When liquids turn into gases, this is called evaporation and that the reverse process is called condensation
When a solid turns into a gas without passing through the liquid state, this is called sublimation
The melting point of water is $0^{o}$ C and that the boiling point of water is $100^{o}$ C
Some materials are magnetic, meaning that they are attracted to a magnet, while other materials are non-magnetic

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| rigid, boiling point, melting point, solid, liquid, gas, sublimation, magnetic<br><br>*New learning:* **irreversible,** dissolve, soluble, insoluble, solvent, solute, solution, filter, sieve, saturation, crystallization, thermal, chemistry, chemical, change, physical change, particle, solution, substance, polymers | <u>New learning</u><br>**Lesson 1**<br>● Know that materials can be sorted in a variety to ways based on their properties<br>● Materials have different uses depending on their properties and state (liquid, solid, gas). Know that a reversible change is one that can be reversed and that examples of this are mixing, dissolving and changes of state where no chemical reaction takes place.<br>● Know that in some solid materials the bonds between particles break when surrounded by a liquid; this allows the liquid to absorb the solid; when this happens, the solid is called a solute, the liquid is called a solvent and the result is a solution;<br><br>**Chemical reaction**, a process in which one or more substances, the reactants, are converted to one or more different substances, the products.<br><br>**Lesson 2**<br>● Know that filtering allows solids and liquids to be separated and that sieving allows solids made up of different sizes parts to be separated<br>● Know that mixtures can be separated by filtering, sieving and evaporation.<br>● That some materials will dissolve in a liquid and form a solution (e.g. sugar in water) while others are insoluble and form sediment (e.g. sand in water).<br>● Know that a given amount of solvent can only absorb a certain amount of solid before no more will dissolve; when this happens the liquid is said to be saturated<br>● Know that when a solvent is evaporated from a solution, the original solute is left behind; the remaining solid will often form crystals – the slower the solvent evaporates, the larger the crystals that will be formed<br><br>**Lesson 3**<br>● Know how to dissolve a solute in a solvent and then how to evaporate the solvent to recover the solute<br><br>**Lesson 4**<br>● Know that an irreversible change is one that cannot be reversed and that examples of this often involve a chemical change where a new material is made, often a gas (e.g. burning wood, rusting, boiling an egg, the reaction of bicarbonate of soda and acid)<br><br>**Lesson 5**<br>● Know how to separate a mixture of sand, salt and small stones by sieving (to remove the small stones), followed by dissolving in water (so the salt is absorbed), followed by filtering to remove the sand from the mixture, followed finally by evaporation of the water to recover the salt.<br><br>**Lesson 6**<br>● Know that materials' different properties can be tested through acting upon them, including testing to find whether materials are magnetic, thermally conductive and electrically conductive; know that the various properties of different materials make them suitable for a given function<br>● Know how to explain orally and in writing the reasons why various materials are suited or unsuited to a function |

Lesson 7

- *How does the temperature of a cup of tea affect the length of time it takes a sugar cube to dissolve? (fair test)*
- *Start observing over time lesson.*

Lesson 8

- Which type of sugar dissolves the fastest? (comparative test)

Lesson 9

- *Which changes are reversible? (e.g. experiment with rusting, adding fizzy tablets to water, burning) (classifying)*
- Experiment between reversible and irreversible changes.

Lesson 10

- How does a nail left in saltwater change over time? (observing over time).
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Lesson 11

- *How does a container of saltwater change over time? (start in lesson 7)*

**Year 5: Forces (physics)**

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| *1.Which shape parachute takes the longest to fall? (fair test)* | *2. What's the relationship between the mass of an object and the time it takes to fall? (comparative)* | *3.Does the shape of a boat matter? (pattern seeking)*<br>*Do all objects fall through water in the same way? (pattern seeking)* | *4.Where in our world is friction helpful/harmful? (research)* | *5.Can you label and name all the forces acting on the objects in each of these situations? (identifying and classifying)* | *6.How does the surface area of a container affect the time it takes to sink? (fair test)* | *7.How do levers, pulleys and gears work? ()*<br>*How has our understanding of friction/gravity changed over time? (research) (Ogden resources)* |

**National Curriculum objectives:**

Sc5/4.2a explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object
Sc5/4.2b identify the effects of air resistance, water resistance and friction, that act between moving surfaces
Sc5/4.2c recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect

**Links to prior learning:**

- Compare how things move on different surfaces. (Y3 - Forces and magnets)
- Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets)
- Observe how magnets attract or repel each other and attract some materials and not others. (Y3 - Forces and magnets)
- Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. (Y3 - Forces and magnets)
- Describe magnets as having two poles. (Y3 - Forces and magnets)
- Predict whether two magnets will attract or repel each other, depending on which poles are facing. (Y3 - Forces and magnets)

**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.

**Links to future learning:**

-Forces as pushes or pulls, arising from the interaction 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 surfaces, 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)

**Key concept(s):**

P1: The universe follows unbreakable rules that are all about forces, matter and energy.

<u>Consolidate</u>

A force can be thought of as a push or a pull
As objects move across a surface there is friction when they rub against each other and that sometimes this friction is larger or smaller.
Applying forces to objects can change their shape.
Know that the roughness of a material is an example of a property

Pushes and Pulls

1. Changes in movement or an object require a net force acting upon it.

**Vocabulary:**

*Consolidate:*

**energy, matter, particle,** surface, friction, force, stretch, squash, rotation, rough, smooth, sliding friction, static friction

*New learning:*

acceleration, air resistance, buoyancy, effort, force meter, fulcrum, gravity, load, mass, mesh, Newton, pivot, rigid, streamlined, terminal velocity, unsupported, water resistance, weight, upthrust, friction, lever, pulley, equilibrium

There are three types of contact force: impact forces (when two surfaces collide), frictional forces (when two surfaces are already in contact) and strain forces (when an elastic material is stretched or squashed).

Objects move differently on rough and smooth surfaces; objects resist movement more on rough surfaces because there is higher friction as the object moves

<u>New learning</u>

**Lesson 1**

- Know that the study of forces is part of the discipline of physics - the study of the processes that shape our world and how we use it.
- Know that a force causes an object to start moving, stop moving, speed up, slow down or change direction.
- Know that gravity is a force that acts at a distance. Everything is pulled to the Earth by gravity. This causes unsupported objects to fall.
- Know that gravity is a force that acts between all objects in the universe, but that it acts much more strongly between objects that have more mass and that are close together.
- Know that pull forces can be measured using a device called a force meter
- Know that the amount of matter (stuff) in an object is its mass

**Lesson 2**

- **Research: Issac Newton**
- **Know that a force is measured in a unit called Newtons, named after a British scientist called Sir Isaac Newton who discovered lots about gravity and how planets move.**
- **To know that he grew up to become a world-famous mathematician, physicist and astronomer.**
- **That Newton was one of the most influential scientists of all time.**
- **That Newton saw an apple fall from a tree and this led to his idea that formed about gravity.**
- **Newton came up with three scientific laws of motion. 1. Every object remains still, or moves at steady speed, unless a force acts on it. 2. The bigger the force on an object the more rapidly it speeds up (or slows down). An object with a small mass speeds up (or slows down) more rapidly than if it had greater mass. When a force acts on it. This is commonly described using algebra, as: $F=m\times a$ (where F is the force, m is the mass and a is the acceleration).**
- **When two objects interact, every force has an equal and opposite reaction force.**

**Lesson 3**

- **Know that acceleration is a change in speed and that unbalanced forces acting on an object cause it to accelerate**
  **Air resistance, water resistance and friction are contact forces that act between moving surfaces. The object may be moving through the air or water, or the air and water may be moving over a stationary object.**
- **Know that air resistance is a force felt by an object as it moves through the air; it is caused by the object bumping into the gas particles that make up air; the quicker an object moves, the more gas particles it bumps into and the more air resistance it experiences**
- **Know that a falling object will accelerate until its air resistance matches the gravitational force pulling it down; at this point, the object will continue to move at this speed (called its terminal velocity) without getting any quicker or slowing down**

**Lesson 4**

- **Know that a parachute's shape increases the air resistance that a falling object experiences, giving it a much lower terminal velocity**
- **Know that water resistance is a force felt by an object as it moves through water; it is caused by the object bumping into the water particles**
- **Know that the shape of an object determines how much air resistance or water resistance it experiences; shapes of object that experience little air resistance or water resistance are described as streamlined**

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| | • **Know how to draw a force diagram with arrows representing the different forces acting on an object**<br><br>**Lesson 5**<br>• **A mechanism is a device that allows a small force to be increased to a larger force. The pay back is that it requires a greater movement. The small force moves a long distance and the resulting large force moves a small distance, e.g. a crowbar or bottle top remover. Pulleys, levers and gears are all mechanisms, also known as simple machines.**<br>• **Know that a lever is a rigid length pivoting around a fulcrum**<br>• **Know that a pulley is a wheel with a fulcrum that supports a moving cable or belt**<br><br>**Lesson 6**<br>• **Know that a gear is a rotating wheel with cut teeth that mesh with the teeth of another gear so that turning one gear turns an adjacent gear in the opposite direction**<br>• **Know that gears, levers and pulleys are simple machines that are used to allow a smaller force to have a greater effect; they do this by moving a smaller force over a longer distance at one end of the machine, which the machine turns into a larger forcer over a small distance at the other end** |

| **Year 5: Earth and Space (physics)** | | | | | | |
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| *1.How far away are the objects in our solar system? (research - scale modelling from Rising Stars or Ogden resources)* | *2. How does shadow length change over the day? (observing over time)* | *3.Are all of the planets the same? (classifying/research)* | *4.Is there a pattern between the size of a planet and the time it takes to travel around the sun? (pattern seeking)* | *5.What shape is the moon and why does it 'change'? (observing over time)* | *6.What unusual objects did (Jocelyn Bell Burnell) discover? (research)* | *7.Extra - Phizzi Practical: heat shield testing (Ogden resources)* |
| **National Curriculum objectives:**<br>Sc5/4.1a describe the movement of the Earth, and other planets, relative to the Sun in the solar system | | | | | | |

Sc5/4.1b describe the movement of the Moon relative to the Earth
Sc5/4.1c describe the Sun, Earth and Moon as approximately spherical bodies
Sc5/4.1d use the idea of the Earth's rotation to explain day and night, and the apparent movement of the Sun across the sky.

**Links to prior 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) Y3 light Y5 Forces.

**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.

**Links to future learning:**
-Gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only). (KS3)

-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)

**Key concept(s):**
**U1**. The Earth is part of a solar system with other celestial objects. Many solar systems form our galaxy.

**Vocabulary:**
*Consolidate:*
**absorption, energy, freezing, melting, orbit, reflection, wave,** Sun, spring, summer, autumn, winter

*New learning:*
planet, satellite, sphere, solar system, eclipse, star, universe, constellation, axis, celestial body, Moon, rotating, lunar, solar, telescope, rotation, orbit, revolve, gravitational, pull, solar eclipse, lunar eclipse

<u>Consolidate</u>
Days are longer in the summer and shorter in winter
Weather changes through the year, getting hotter in the summer and colder in the winter
Earth orbits the Sun with one orbit constituting a year of 365/366 days
Light is a form of energy
We need light to see things and that darkness is the absence of light
Light travels in straight lines
Everything that we can see is either a light source or something that is reflecting light from a light source into our eyes
The Sun is a light source, but that the Moon is not and is merely reflecting light from the Sun
Many light sources give off light and heat
The Sun gives off light and heat when hydrogen turns into helium
(NB: the Sun and the Earth are capitalized when being discussed in an astronomical context.)

<u>New learning</u>

**Lesson 1**
- **Know that the study of Earth and space is part of the discipline of physics - the study of the processes that shape our world and how we use it.**
- **Know that the universe comprises all matter and space in existence**

Know that a celestial body is a large object in the universe (and the study of this is called astronomy).

**Lesson 2**
- **Know that the Sun, Earth and Moon are approximately spherical**

- **Know that a star is an exceptionally hot ball of gas, originally made from hydrogen and helium**
- **Know that the Sun is a star. It is at the centre of our solar system.**
- **Know that a planet (e.g Earth) is defined as a spherical celestial body that orbits a star and that has cleared the neighbourhood of its orbit of other objects (some of which crash into the planet and others that become moons of that planet)**
- **Know it was once thought that everything orbited the Earth, but that scientists like Copernicus and Galileo used telescopes and measurement to show that the Earth orbited the Sun**

**Lesson 3**

- **Know that as the Earth rotates, the Sun <u>appears</u> to move across the sky**
  **Know that a satellite orbits a planet and that moons are natural satellites**
- **Know that the Moon orbits the Earth. It takes approximately 28 days to complete its orbit**
- **Know that as the Moon orbits the Earth, different parts of it are lit up by the Sun, which is why we see a different shape lit up on the Moon as the lunar cycle progresses**

**Lesson 4**

- **Know that humans have sent man-made satellites into orbit that assist with telecommunication**
- **Know that all the planets in the solar system orbit the Sun in fixed orbits and that the further away they are from the Sun, the longer their orbit**
- **Know that the Earth spins around an imaginary line through its centre called an axis and that this axis is tilted relative to the Earth's orbit**
- **Know that Earth rotates on its axis every 24 hours, which results in day (half facing the Sun) and night (half facing away from the Sun)**
- **Know that the tilt of the Earth towards and away from the Sun's light as the Earth orbits the Sun leads to the seasons as during winter the light is spread over a wider area**

**Lesson 5**

- **Know that a solar eclipse occurs when the Moon is between the Sun and the Earth, casting a shadow on the Earth; a lunar eclipse occurs when the Earth is between the Sun and the Moon, casting a shadow on the Moon**
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**Lesson 6**

- **Know that there are eight planets in our solar system: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune. Know that they travel around the Sun in fixed orbits.**
- **Know that the universe is utterly vast and that our solar system makes up a tiny fraction of the universe**

**Year 5: Living Things and their Habitats (biology)**

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| *1.How does a bean change as it germinates? (observing over time)* | *2. How do life cycles vary in the animal kingdom? (researching)* | *3.Do animals all (gestate) for the same period of time? (research, identify and classify)* | *4.Who is David Attenborough and why is he a 'national treasure'? (research)* | *5.* | *6.* |

**National Curriculum objectives:**
Sc5/2.1a describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird
Sc5/2.1b describe the life process of reproduction in some plants and animals.

**Links to prior learning:**
- 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)

**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.

**Links to future learning:**
-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)

**Key concept(s):**
NW1. Animals and plants are living things, they have similarities and differences.

**Vocabulary:**
*Consolidate:*
**decay,** plant, structure, reproduction, nutrients, reproduction, fish, bird, amphibian, reptile, mammal, fruit, nectar, anther, ovary, ovule, petal, pollen, stigma, style, stamen, function, exchange, dispersal, fertilization, insect, vertebrates

*New learning:*
metamorphosis, pupa, larva, chrysalis, caterpillar, tadpole,

<u>Consolidate</u>
Know that studying living things and their habitats is part of the discipline of biology - the study of living things and their vital processes.
Living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things.
A trout is an example of fish, a frog is an example of an amphibian; a lizard is an example of a reptile; a robin is an example of a bird; a rabbit and a human are examples of a mammal
Fish, amphibians, reptiles, birds and mammals are similar in that they have internal skeletons and organs; these are known as vertebrates, which means they are animals that have a backbone
Fish are different in having gills so that they can breathe underwater **and** have scaly skin
Amphibians are different in that they begin their lives with gills but then develop lungs and breath on land
Reptiles are different in that they breath air **and** have scaly skin
Birds are different to other animals in that they have feathers and wings.

<u>New learning</u>

**Lesson 1**
**Know that the life cycle of a living thing is a series of stages of development starting with a fertilized egg in animals or a seed in many plants**
**Know that in most mammals (e.g. dogs) a fertilized egg develops in the womb into an embryo and is then born and fed on milk before it is weaned onto the food that is adapted to eat; it then develops to maturity in a period called adolescence after which it can reproduce and the cycle can begin again**

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| hatchling, fledgling, insect, naturalist asexual, reproduction sexual, reproduction environment, tuber diversity | **Lesson 2**<br>**Know that in amphibians (e.g. frogs) a fertilized egg develops into an embryo and then hatches into a tadpole; the tadpole develops adult characteristics, metamorphoses into the adult form after which it can reproduce and the cycle can begin again**<br>*How do life cycles vary in the animal kingdom? (researching)*<br><br>**Lesson 3**<br>**Know that in many insects (e.g. butterflies) a fertilized egg develops into wingless feeding form called a larva (caterpillar); the larva feeds then later becomes a pupa (chrysalis) with a protective cocoon; inside this cocoon, the pupa metamorphoses into the adult butterfly after which it can reproduce and the cycle can begin again**<br><br>**Lesson 4**<br>**Know that in birds (e.g. robins) a fertilized egg hatches in a nest (a hatchling) and is fed by its parents until it is ready to fly (i.e. becomes a fledgling); it then leaves the nest and grows into an adult after which it can reproduce and the cycle can begin again**<br><br>**Lesson 5/6**<br><br>**Know that plants reproduce both sexually and asexually. Bulbs, tubers, runners and plantlets are examples of asexual plant reproduction which involves only one parent.**<br>**Know that gardeners may force plants to reproduce asexually by taking cuttings. Sexual reproduction occurs through pollination, usually involving wind or insects.** |

**Year 5: Animals including humans (biology)**

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| *1.Are the oldest children in our school the tallest? (pattern seeking)* | *2. What is similar and different about the stages in the human life cycle? (classifying)* | | | | *6.* |

**National Curriculum objectives:**
Sc5/2.2a describe the changes as humans develop to old age.

**Links to prior learning:**
Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans)

**Common Misconceptions**
Some children may think: a baby grows in a mother's tummy; a baby is "made".

**Links to future learning:**
-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)
-Y6 SRE

**Key concept(s):**
1. Animals and plants are living things, they have similarities and differences.
2b. Bodies are complex systems that need to be taken care of

**Vocabulary:**
*Consolidate:*
mammal, reproduce, aging, mature

*New learning:*
life cycle, life span, embryo, womb, weaned, adolescence, gestation, puberty, reproduce, adolescence, hormone, memory, dormant, fertilisation, chromosome, degeneration

<u>Consolidate</u>
Know that studying animals including humans is part of the discipline of biology - the study of living things and their vital processes.
Mammals are different to other animals in that they have fur/hair **and** they feed milk to their young
Different parts of plants have one or more functions (jobs)
Roots collect water and minerals from the soil, and hold the plant firmly in the ground
The stem holds up the leaves so that they can gather light to make food and holds up the flowers so that they can receive pollen and disperse their fruits; the stem also transports water and minerals from the roots to the other parts of the plant
The leaves make food by trapping light and using its energy to turn carbon dioxide and water into carbohydrates
The function of a flower is reproduction, where flowers of the same kind exchange pollen – made by an anther – in a process called fertilisation, and a structure in the flower's ovary called an ovule becomes a seed; the ovary then becomes a fruit which helps the seed leave the plant in a process called dispersal

<u>New learning</u>

(NB: This needs to be taught alongside PSHE. The new statutory requirements for relationships and health education can be found <u>online</u>.)

**Lesson 1**
**Know that as part of their life cycle, plants and animals reproduce. Animals, including humans, have offspring which grow into adults.**
***What is similar and different about the stages in the human life cycle? (classifying)***

**Lesson 3/4**

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| | **Know that humans go through stages of development; they begin as fertilized eggs and then develop into embryos before developing into babies; once they are born, these newborn babies become infants (roughly 2 months to 2 years) then into young children (roughly 2-12 years old); children develop into adults during adolescence (roughly 12-16 years old) at which age they become physically capable of reproduction; as adults develop into old age (roughly 55+ years old) they experience changes in their body which require them to move more carefully and rest more frequent.**<br>*Are the oldest children in our school the tallest? (pattern seeking)*<br><br>**Lesson 5**<br>**In humans and some animals, these offspring will be born live, such as babies or kittens, and then grow into adults.**<br>**In other animals, such as chickens or snakes, there may be eggs laid that hatch to young which then grow to adults.** |

**Year 6: Ongoing throughout the year - working scientifically**

**National Curriculum objectives:**

Sc5/1.1 planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
Sc5/1.2 taking measurements, using a range of scientific equipment, with increasing accuracy and precision
Sc5/1.3 recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, and bar and line graphs
Sc5/1.4 using test results to make predictions to set up further comparative and fair tests
Sc5/1.5 reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of results, in oral and written forms such as displays and other presentations
Sc5/1.6 identifying scientific evidence that has been used to support or refute ideas or arguments.

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| **Key concept(s):**<br>- Observing over time<br>- Pattern seeking<br>- Research using Secondary Sources - Identifying & classifying<br>- Comparative tests - Fair tests<br><br>**Vocabulary:**<br>*Consolidate:*<br>prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis<br><br>*New learning:* | <u>Consolidate</u><br>Know that we can ask questions and answer them by setting up scientific enquiries<br>Know how to make relevant predictions that will be tested in a scientific enquiry<br>Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same<br>Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stopwatches<br>Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw a neat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table<br>Know – with structured guidance - how to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion<br>Know how to precis a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry<br>Know that scientific enquiries can suggest relationships, but that they do <u>not</u> prove whether a prediction is true<br>Know that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which conditions can vary even, and that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry<br>Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts (e.g. effect of changing sunlight on a plant – does this work with other plants / different types of light / etc)<br>Know that they can draw conclusions from the findings of other scientists |

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| line graph, relationship, outlier | Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry<br>Know how to choose appropriate variables to test a hypothesis (e.g. plant height as a dependent variable when measuring effect of light on plant growth)<br>Know how to identify conditions that were imperfectly controlled and can explain how these might affect results<br>Know how to accurately use further measuring devices, including digital and analogue scales, measuring cylinders and beakers, recognizing the relative accuracy of each device<br>Know how and when to repeat measurements, how to find an average of a set of measurements and how to recognize and remove outliers from a set of data, justifying the removal as a potential mis-measurement<br>Know how to independently write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion<br>Know how to present brief oral findings from an enquiry, speaking clearly and with confidence and using notes where necessary<br>Know examples of instances where scientific evidence has been used to support or refute ideas or arguments (e.g. fossil records as evidence of natural selection) |

**Year 6: Light (physics)**

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| *1.Why can I hear round corners but not see round corners? (pattern seeking)* | *2. Can you identify all the colours of light that make white light when mixed together? What colours do you get if you mix different colours of light together? (identifying and classifying)* | | | | | |

**National Curriculum objectives:**

Sc6/4.1a recognise that light appears to travel in straight lines
Sc6/4.1b 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
Sc6/4.1c 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
Sc6/4.1d use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them

**Links to prior learning:**

- 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)

**Common Misconceptions**

Some children may think: we see objects because light travels from our eyes to the object. This is mainly illustrated in their diagrams rather than their speech; that they can 'see round corners'; that features are visible on shadows; that only shiny objects reflect light; that light is just one colour.

**Links to future learning:**

-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)

**Key concept(s):**
E2. Light and sound travel in waves and reflect off objects.

**Vocabulary:**
*Consolidate:*
**absorption, energy, property, reflection, wave,** mirror, incident

<u>Consolidate</u>

Know that the study of light is part of the discipline of physics - the study of the processes that shape our world and how we use it.
Light is a form of energy
Energy comes in different forms and can be neither created nor destroyed, only changed from one form to another
We need light to see things and that darkness is the absence of light
Light travels in straight lines
Light is reflected when it travels from a light source and then 'bounces' off an object
Everything that we can see is either a light source or something that is reflecting light from a light source into our eyes
The Sun is a light source, but that the Moon is not and is merely reflecting light from the Sun
Many light sources give off light and heat

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| ray, image, beam, photons, solid, opaque, transparent, object, ksource<br><br>*New learning:*<br>angle of incidence, angle of reflection, refraction, spectrum, translucent, medium, periscope | The Sun gives off light and heat when hydrogen turns into helium<br>Filaments in traditional bulbs heat up until they glow, giving off light and heat<br>Fluorescent bulbs glow when electricity adds energy to a gas within the bulb<br>Sunglasses can protect eyes from sunlight **but looking at the Sun directly – even with sunglasses – can damage the eyes**<br>Opaque objects block light creating shadows and that light passes through transparent objects<br>Opacity/transparency and reflectiveness are properties of a material<br>As objects move towards a light source, the size of the shadow increases<br>The changing of shadow size can be shown by drawing a diagram with straight lines representing light<br><br>(NB: the Sun and the Moon are capitalized when being discussed in an astronomical context.)<br><br><u>New learning</u><br>**Lesson 1**<br>**Know that translucent objects allow some light to pass through, but some of the light changes direction as it passes through the object; this means that an something seen through a translucent object is not clearly defined**<br>**Know that when light passes from one medium to another (e.g. from air to water), it changes direction; this is called refraction; this happens because light travels at different speeds through different media.**<br><br>**Lesson 2**<br>**Know that a rainbow is caused by the refraction (*,reflection and dispersal)* of light through water droplets**<br>**Know that white light comprises all the colours of light**<br>**Know that they correct order of the colour spectrum (or a rainbow) is red, orange, yellow, green, blue, indigo, violet**<br>**Know that white light refracted by two surfaces in a prism will spread out so that all of its constituent colours can be seen; this array of colours is called a spectrum; it happens because the different colours of that constitute white light travel at different speeds.**<br>**Know that (unlike art) the primary colours of light are red, blue and green**<br>**Know that we see colours in objects because some colours in the spectrum are absorbed while others are reflected**<br><br>**Lesson 3**<br>**Know how to draw a diagram to show why the shape of a shadow will match the shape of an object**<br>**Know that when light reflects off an object, the angle of incidence is equal to the angle of reflection**<br>**Know that a periscope takes advantage of the predictable angles of incidence and reflection to allow an image to be shown to a viewer**<br><br>**Lesson 4**<br>**Know that the eye is spherical**<br>**Know that the cornea and lens work together to refract light to help the light to focus**<br>**Know that the iris controls the pupil, which controls how much light enters the eye**<br>**Know that the retina contains millions of sensors which convert light into electrical signals to send to the brain through the optic nerve.**<br><br>**Lesson 5/6**<br>***Why can I hear round corners but not see round corners? (pattern seeking) - investigation***<br>***Plan and carry out an investigation - see year 6 working scientifically.*** |

**Year 6: Electricity (physics)**

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| *1.How have our ideas about electricity changed over time? (research - see Ogden resources)* | *2. Is it possible to change the brightness of a bulb or the volume of a buzzer? / How does the voltage of the batteries in a circuit affect the brightness of the lamp? (pattern seeking)* | *3.Are some ways of generating electricity better for the environment than others? (research)* | | | | |

**National Curriculum objectives:**

Sc6/4.2a associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit
Sc6/4.2b 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
Sc6/4.2c use recognised symbols when representing a simple circuit in a diagram.

**Links to prior learning:**

- 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)

**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.

**Links to future learning:**

-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)

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| **Key concept(s):**<br>E1. Electricity can only flow in a complete | <u>Consolidate</u><br>Know that the study of electricity is part of the discipline of physics - the study of the processes that shape our world and how we use it.<br>An object is made from/of a material |

circuit.

**Vocabulary:**
*Consolidate:*

**circuit, component, conductor, energy, insulator, particle, property,** material, appliance, charge, electron, battery, cell, bulb, buzzer, switch, wire, current electricity, static electricity, negative terminal, positive terminal, voltage, chemical reaction, emit, source, fossil

*New learning:*
series circuit, parallel circuit, resistance, voltage, static electricity, short circuit, fuse, electromagnet, detector, synchronise

Metal is a material from which objects can be made.
Matter (stuff) is made from tiny building blocks
Electrical energy is a form of energy
Energy comes in different forms and can be neither created nor destroyed, only changed from one form to another
Static electricity is an imbalance of charged particles on a material; it does <u>not</u> operate by flowing around a complete circuit
Current electricity  is the flow of charged particles called electrons around a circuit
Electrical current flows well through some materials, called electrical conductors, and poorly through other materials, called electrical insulators
Conductors have free electrons, and when electrical current flows through a conductor, the electrons move like people in a queue
Electrical conductivity (how well a material conducts electricity) is an example of a property
Metals are good electrical conductors
A chemical reaction inside a cell produces the charged particles that can flow around a circuit
More than one cell lined up to work together is called a battery
Electrical current can flow if there is a complete circuit
Wires – which contain a conductor inside them, usually made of metal – can allow electrical current to flow around a circuit
When electrical current flows through a circuit components within that circuit – such as buzzers which make a noise and bulbs which emit light – begin to work
A switch functions by completing or breaking a complete circuit
A simple circuit can be constructed using components
Exposure to high levels of electrical current can be dangerous

<u>New learning</u>

### Lesson 1
***How have our ideas about electricity changed over time? (research - see Ogden resources)***

**Ideas over time - electricity resources**

### Lesson 2
**Know that voltage is a measure of the power of a cell to produce electricity; it is a measure of the 'push' of electric current, not the size of the electric current**
**Know that as the number and voltage of cells in a circuit increases, the brightness of a bulb or the volume of a buzzer will increase (though too high a voltage may 'blow' the bulb or buzzer)**
**Know how to draw simple circuit diagrams**
**Know the symbols for a battery, bulb, motor, buzzer and wire**

### Lesson 3
**Know how to predict whether components will function in a given circuit, depending on whether or not the circuit is complete; whether or not a switch is in an on or off position; and whether or not there is a cell to provide electrical current to the circuit**
**Know that two bulbs in a circuit can be wired up to create a series circuit or a parallel circuit; if one bulb blows in a series circuit the other will not shine as the circuit has been broken; in contrast, if one bulb blows in a parallel circuit, there will still be a complete circuit for the other bulb so it will continue to shine; use this knowledge to explain the advantages of using parallel circuits (e.g. in the lighting in homes).**

### Lesson 4
**Know that electricity can be generated from different energy sources - such as coal, nuclear, natural gas, hydroelectric, wind, and oil, as well as solar energy, tidal power, and geothermal sources.  That some energy sources are environmentally friendly sources and some are not and are harmful to the environment..**

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| | **Lesson 5**<br>**Know that Coal, crude oil, and natural gas are all considered fossil fuels because they were formed from the fossilized, buried remains of plants and animals that lived millions of years ago. Know that fossil fuels have harmful environmental effects (detailed in the Year 6 geography curriculum)** |

**Year 6: Animals including humans (circulation) (biology)**

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| *1.Which types of exercise have the greatest effect on our heart rate? (fair test)* | *2.* *Are all drugs bad? (research)* | | | | |

**National Curriculum objectives:**

Sc6/2.2a identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood
Sc6/2.2b recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function
Sc6/2.2c describe the ways in which nutrients and water are transported within animals, including humans.

**Links to prior learning:**

- 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)
- Skeleton protects organs (Y3 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.

**Links to future learning:**

-The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases. (KS3)
-The effects of 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)

**Key concept(s):**

1. Animals and plants are living things, they have similarities and differences.
2b. Bodies are complex systems that need to be taken care of

<u>Consolidate</u>

Living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things.
Animals, including humans, need food, water and air to survive
People need to exercise often to help their body stay strong and fit
The skeleton protects our vital organs
Keeping clean, including washing and brushing teeth, is an important part of staying healthy
There are food groups: fruit and vegetables, carbohydrates, protein, dairy, fat and sugary foods

**Vocabulary:**
*Consolidate:*
**Circuit, component, energy, growth,** survival, nutrients, consumption, skeleton, ribcage, protein, carbohydrate, fat, digestion, skeleton, organ, oxygen

*New learning:*
artery, aorta, atri(um/a), blood vessels capillary, circulatory system, vein, pulse, ventricle(s), replenished, resting heart rate, body, valve, (de)oxygenated, transfusion, immune

Proteins are good for growth, carbohydrates for energy and fruit and vegetables provide vitamins and minerals which help keep us healthy (e.g. calcium for healthy bones and teeth)
More than half of our diet should be made up of carbohydrates, fruit and vegetables
Fats and sugary foods should be eaten rarely and in small amounts
Getting the right amount of each food group (including over half of the diet made up of fruit, vegetables and carbohydrates) is called a balanced diet
A lack of a nutrient can cause ill health; for example, a lack of vitamin D leads to a disease called rickets
Know that excess of a food group can cause ill health, such as tooth decay due to excess sugar
**NB – some food groups are difficult to afford for some families so sensitivity is required in teaching this area**
Food passes through the body with the nutrients being extracted and the waste products excreted, and that this process is called digestion
The process of digestion involves breaking complex foodstuffs into simpler building blocks that can be absorbed by the body

<u>New learning</u>

**NB – note that discussion of drugs needs sensitive teaching due to potential family circumstances. Consult the school's policy and PSHCE schemes of work.**

**Lesson 1**
**Know that the heart and lungs are organs protected by the ribcage and sternum**
**Know that blood travels around the body transporting nutrients that have been absorbed into the bloodstream from digestion; blood also carries oxygen around the body which is used to power the body; this use of oxygen to create energy is called respiration**
**Know that the heart beats, pumping blood around the body and that blood vessels carry the blood;**
**Know that the heart is an involuntary muscle that beats perpetually throughout life**

**Lesson 2**
**Know that arteries carry blood away from the heart; veins carry blood towards the heart; capillaries are tiny blood vessels that connect arteries and veins**
**Know that the heart is composed of four chambers: two atria and two ventricles; Know that the aorta is the largest artery in the body and most major arteries branch off from it**
**Know that valves stop blood from flowing in the wrong direction**
**Know that blood travels around the body in a double circulation: to the lungs to pick up oxygen, then back to the heart to be pumped to the cells of the body**
**Know that the blood also transports carbon dioxide to the lungs to be removed**
**Know that the heart is in the centre of the chest and that people often think it is on the left because the muscular wall is thicker to pump blood further (to the body)**

**Lesson 3**
**Know that blood is composed of red blood cells, white blood cells, platelets and plasma (proportion and their major functions)**
**Know that white blood cells play an important role in our immune system (helping the body to fight infections and diseases)**
**Know that our immune system works to identify and remove 'foreign microbes' from our body**
**Know that there are different blood types and that people donate blood to be used in transfusions**

**Lesson 4 / 5**

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| | **Know that diet, exercise, drugs and lifestyle have an impact on the way our bodies function. They can affect how well our heart and lungs work, how likely we are to suffer from conditions such as diabetes, how clearly we think, and generally how fit and well we feel.**<br>**Know that when we exercise, our heart beats more frequently so that the oxygen that is used around the body can be replenished; it returns to a resting heart rate afterwards; fitter people tend to have lower resting heart rates**<br>**Know that drugs are chemicals that have an impact on the natural chemicals in the body; know that drugs can be harmful or helpful, depending on what they are and how they are used; know that all drugs can be harmful if overused**<br>**Know that paracetamol and aspirin are examples of drugs that can be helpful as a painkiller**<br>**Know that cannabis and cocaine are examples of illegal drugs that can have serious negative effects**<br>**Know that alcohol and tobacco are examples of drugs that are legal to adults but that can have serious negative effects, such as liver disease and lung disease, respectively.**<br><br>*Are all drugs bad? (research)*<br><br>*Which types of exercise have the greatest effect on our heart rate? (fair test)* |

**Year 6: Living Things and their Habitats (classification including microorganisms) (biology)**

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| *1.How would we classify these (unfamiliar species)? (identify and classify)* | *2. Who was Carolus Linneaus and why is his work important? (research)* | *3.Are all invertebrates the same? (classifying/research - make keys, venn diagrams, carroll diagrams etc)* | *4.What are microorganisms and are they always harmful? (research)* | *5.What happens to bread if you leave it on the windowsill for two weeks? (observing over time)* | *6. What are vaccines and how do they work? Why is the work of Edward Jenner significant? (research)* | |

**National Curriculum objectives:**
Sc6/2.1a 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
Sc6/2.1b give reasons for classifying plants and animals based on specific characteristics.

**Links to prior learning:**

- 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)

**Common Misconceptions**
Some children may think: all micro-organisms are harmful; mushrooms are plants.; that only plants and animals are living things; there may also be misconceptions about what counts as a characteristic (such as using temporary features or opinions).

**Links to future learning:**
-Sc6/2.3a recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago (common ancestry/tree of life idea)
-Sc6/2.3c identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.
-Differences between species. (KS3)

**Key concept(s):**
E1. Animals and plants are living things, they have similarities and differences.
E2. All living things are interconnected in some way

**Vocabulary:**
*Consolidate:*

<u>Consolidate</u>
Know that studying living things and their habitats is part of the discipline of biology - the study of living things and their vital processes.
Animals can be grouped based on their physical characteristics (e.g. vertebrates and invertebrates) and based on their behavior (e.g. herbivores, carnivores and omnivores)
Living things are divided into kingdoms: the animal kingdom, plants, fungi, bacteria, and single-celled organisms
A species is a group of living things have many similarities that can reproduce together produce offspring
A classification key uses questions to sort and identify different living things
A classification key can be used to identify living things
Living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things.
A trout is an example of fish, a frog is an example of an amphibian; a lizard is an example of a reptile; a robin is an example of a bird; a rabbit and a human are examples of a mammal

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| **component, habitat,** plant, structure, fish, bird, amphibian, reptile, mammal, kingdom, classification key, species, fungi, bacteria, characteristics, offspring, vertebrate, invertebrate, insect<br><br>*New learning:* micro-organism, virus, thorax, arthropod, abdomen, arachnid, antenna, jointed limbs, cell, taxonomy, vaccine, inoculate, immune | Fish, amphibians, reptiles, birds and mammals are similar in that they have internal skeletons and organs; these are known as vertebrates, which means they are animals that have a backbone<br>Fish are different in having gills so that they can breathe underwater **and** have scaly skin<br>Amphibians are different in that they begin their lives with gills but then develop lungs and breath on land<br>Reptiles are different in that they breath air **and** have scaly skin<br>Birds are different to other animals in that they have feathers and wings<br>Mammals are different to other animals in that they have fur/hair **and** they feed milk to their young<br>Different parts of plants have one or more functions (jobs)<br>Know that plants can make their own food whereas animals cannot.<br>Know that animals can be divided into two main groups: those that have backbones (vertebrates); and those that do not (invertebrates).<br>Know that vertebrates can be divided into five small groups: fish; amphibians; reptiles; birds; and mammals. Each group has common characteristics.<br>Know that invertebrates can be divided into a number of groups, including insects, spiders, snails and worms.<br>Know that plants can make their own food whereas animals cannot.<br>Know that plants can be divided broadly into two main groups: flowering plants; and non-flowering plants.<br><br><u>New learning vocabulary</u><br><br>**Lesson 1 - Cells**<br>**Know that (in biology) cells are the tiny building blocks that make up living things, that there are different types of cell that perform different functions (they will already have heard of blood cells)**<br>**Know that (in biology) tissue is the name for groups of similar cells that carry out a function**<br>**Know that there are three types of micro-organism: viruses, fungi and bacteria; of these three, viruses are often not really considered to be alive by many scientists mainly because they don't have the 'machinery' to reproduce inside them.**<br><br>**Lesson 2 - Microorganisms**<br>**Know that scientists don't always agree on how many groups to classify organisms into**<br>**Know that microorganisms are sometimes helpful and sometimes harmful to humans.**<br>**Know that germs are disease-causing bacteria**<br><br>**Lesson 3 - Classifying**<br>**Know that an arthoropod is an invertebrate with a hard , external skeleton and jointed limbs**<br>*Are all invertebrates the same? (classifying/research - make keys, venn diagrams, carroll diagrams etc)*<br><br>**Know that insects are a type of arthropod; their bodies consist of six legs, a head, a thorax and an abdomen; most insects also have a pair of antennae and a pair of wings**<br>**Know that an arachnid (e.g. spider) is a type of arthropod with eight legs and no antennae or wings**<br>**Know that a crustacean is a type of arthropod with two pairs of antennae (e.g. woodlouse)**<br>**Know that a myriapod is an arthropod with a flat and long or cylindrical body and many legs (e.g. centipede)**<br>*How would we classify these (unfamiliar species)? (identify and classify)*<br><br>*Know that ideas about taxonomy have evolved over time, stretching as far back as Aristotle (Ancient Greece)*<br>*Know that Carolus Linneaus was a Swedish botanist who formalised the modern system of naming organisms. He is often known as 'the father of modern taxonomy (classification)'* |

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| | *Who was Carolus Linneaus and why is his work important? (research)*<br><br>**Lesson 4**<br>**Know that scientists use Linneaus's system of binomial nomenclature (Binomial nomenclature is the formal naming system for living things that all scientists use. It gives every Know that an arthoropod is an invertebrate with a hard , external skeleton and jointed limbs**<br>**Know that insects are a type of arthropod; their bodies consist of six legs, a head, a thorax and an abdomen; most insects also have a pair of antennae and a pair of wings**<br>**Know that an arachnid (e.g. spider) is a type of arthropod with eight legs and no antennae or wings**<br>**Know that a crustacean is a type of arthropod with two pairs of antennae (e.g. woodlouse)**<br>**Know that a myriapod is an arthropod with a flat and long or cylindrical body and many legs (e.g. centipede)**<br>**species a two-part scientific name). This is important so that scientists can communicate and have common understanding without the difficulties caused by difference in language or culture).**<br><br>**Lesson 5**<br>**Know that vaccines involve exposing humans to a less harmful microbe in order to inoculate someone against a deadlier microbe**<br>**Know that symptoms like coughing, sneezing and fever are signs that the immune system is working**<br>**Know that Edward Jenner tested his hypothesis by injecting a boy with material from cowpox in order to immunise against smallpox (which has since been eradicated) (Research)** |

**Year 6: Evolution and Inheritance (biology) (All Summer Term)**

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| *1.How are certain animals adapted to their environments? (identify and classify)* | *3. How did Darwin's observations support the theory of evolution?/Did humans really evolve from apes'?* | *3.What happened when Charles Darwin visited the Galapagos islands? (research)* | *4.How do the skeletons of apes, humans and Neanderthals compare? (identify and classify)* | | |

**National Curriculum objectives:**

Sc6/2.3a recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago
Sc6/2.3b recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents
Sc6/2.3c identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

**Links to prior learning:**

- 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)
- 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)

**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; that the humans evolved from apes in the linear way presented in common evolution pictures (rather than branching diagrams).

**Links to future learning:**

-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)

**Key concept(s):**

2c. Fossils are formed over millions of years and appear in certain rocks.

**Vocabulary:**

*Consolidate:*
**birth, decay, energy, habitat**, **irreversible, extinction,** microhabitat, dead, life cycle, food chain, source, nutrients,

<u>Consolidate</u>

Living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things.
Polar bears are an example of an animal adapted to its environment – thick fur for warmth and oily paw pads to ensure that they don't freeze to the ice.
Sharks are another example – smooth skin and streamlined shape for quick swimming; and gills for breathing underwater
Cacti are an example of a plant adapted to its environment – thick skin keeps a store of water safe; sharp spikes keep animals from stealing the water
Pine trees have thick bark and pine cones to protect against cold winters
Woodlice live under logs – an example of a microhabitat - as they need somewhere dark and damp so that they do not dry out
Frogs can live in ponds – an example of a microhabitat - as they water in which to lay their eggs (frogspawn)
A species is a group of living things have many similarities that can reproduce together produce offspring
Changes to the environment can make it more difficult for animals to survive and reproduce; in extreme cases this leads to extinction, where an entire species dies

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| reproduction, consumption, environment, extinction, species, characteristic, adaptation, fossilisation, decompose, sediment, dissolve<br><br>*New learning:*<br>evolution, natural selection, variation, advantageous, genes, genetic, DNA, offspring, ancestor, inherit, offspring, hereditary | Human activity – such as climate change caused by pollution - can change the environment for many living things, endangering their existence<br>The polar bear is a famous example of climate change endangering the existence of a species; as the climate changes and gets warmer, the sea ice on which polar bears live reduces in amount making it harder for them to survive and reproduce<br>Fossils form when a plant or animal dies and is quickly covered with silt or mud so that it cannot be rotted by microbes or eaten by scavenging animals; in time layers of sediment build, squashing the mud and turning it to stone around the dead plant or animal; the materials in the body are replaced by minerals that flow in water through the rock, leaving a rock in the shape of the animal or plant that was once there<br><br>**<u>New learning</u>**<br><br>**Lesson 1 / 2**<br>**Know that studying living things and their habitats is part of the discipline of biology - the study of living things and their vital processes.**<br>**Know that all life on Earth began from a single point around 4.5 billion years ago**<br>**Know that humans have only been on Earth for a tiny fraction of this time**<br>**Know that living things changes over time and that this gradual change is called evolution**<br>**Know that natural selection is the cause of this change; natural selection works as across a species there is natural variation within a species; there is also competition to survive and reproduce and that members of a species with advantageous characteristics survive and reproduce - these characteristics are passed down to their offspring; members of a species with less advantageous characteristics do not survive and reproduce – these characteristics are not passed down to offspring**<br><br>**Lesson 3**<br>**Know that characteristics can include physical features (such as eye colour) but that some characteristics, such as blood type, are not visible**<br>**Know that variation by natural selection means that favourable traits are passed down over generations**<br>**Know that evolution is responsible for the diversity of life on earth**<br>**Know that all life is related through common ancestors. This can be described using the metaphor of 'the tree of life'. Greater similarity between species means that the species share a more recent common ancestor**<br>**Know that natural selection can lead to speciation, where one species gives rise to a new and distinctly different species (such as how polar bears have evolved from brown bears).**<br><br>**Lesson 4**<br>**Know that offspring are vary and are not identical to their parents**<br>**Know that offspring get half of their genes from their mother and half from their father**<br>**Know that humans have used their knowledge of genes to engineer the artificial breeding of animals or plants e.g. dogs.**<br>**Know that our appearance is shaped by environmental as well as genetic features**<br>**Summarise with the children that offspring resemble their parents but don't look identical, and why this is.**<br><br>**Lesson 5**<br>**Some characteristics are carried by a single pair of genes, others by lots of genes working together.**<br>**That genes are made from DNA**<br>**Know that Charles Darwin posited this theory of evolution by natural selection**<br>**Know that Alfred Russell Wallace independently developed the theory of evolution by natural selection at the same time**<br>**Know that the gradual change of species over millions of years can be observed by looking at examples of fossils** |

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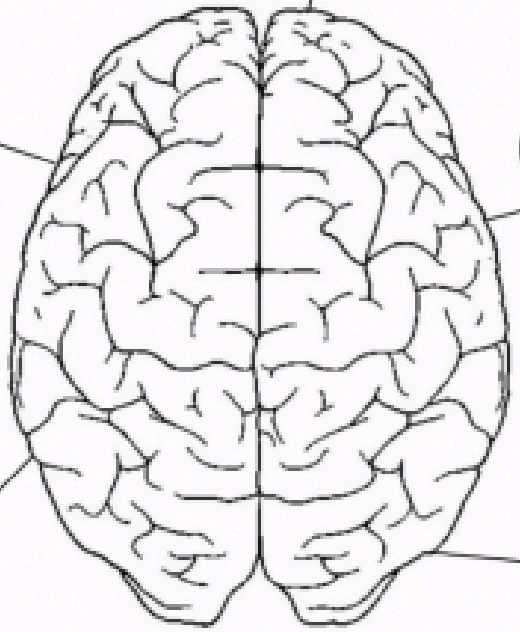
| | **Summer 2 - Check RL - Add longer research projects - see top questions - human activity and how it is affecting the environment and therefore affecting animals and habitats. Scientists research.** |

# Curriculum Review



## The Natural World

- Fossils are formed over millions of years and appear in certain rocks
- All living things, past and present, are interconnected in some way.
- Bodies are complex systems that needs to be taken care of.
- Animals and plants are living things, they have things that are the same and different.
- Weather changes by the day and with the seasons.

## Materials

- Materials are different, each material is useful for different jobs because of their properties
- All matter is in the solid, liquid or gas state at room temperature but may change state if warmed or cooled

## Pushes and Pulls

- Changes in movement on an object require a net force to be acting on it.

## Energy

- Electricity can only flow in a complete circuit.
- Light and sound can reflect off objects.

## The Universe

- The Earth is part of a solar system with other celestial objects, many solar systems form our galaxy

Useful websites:
https://explorify.wellcome.ac.uk/ for science videos, discussion prompts, lesson starters and more
https://www.ogdentrust.com/resources-cpd/resources for research tasks and practicals
https://www.stem.org.uk/ vast collection of resources, schemes of work etc.
https://bpes.bp.com/resources/list for collections of free primary resources
https://edu.rsc.org/resources/primary for free primary chemistry resources https://edu.rsc.org/resources/collections/science-ideas-webs for ideas for topic links to add context/real world relevance (not just chemistry)
https://www.jamesdysonfoundation.com/resources.html STEM resources and collections of practicals
https://www.bbc.co.uk/bitesize/subjects/z2pfb9q for online interactives
https://www.childrensuniversity.manchester.ac.uk/learning-activities/science/ for subject knowledge and interactives
http://spacelink.org/teacher-zone/key-stage-2/ Earth and Space resources
https://www.rsb.org.uk/education/teaching-resources/primary-schools
Topmarks and Crickweb for interactives