SCIENCE CURRICULUM 2022 - 2023

EYFS: Understanding the World

NOTE:
Your curriculum overviews, knowledge organisers and end of topic assessments are all included in this file.

Please make sure that you use these from now on to ensure consistency and progression.

I will be using these as the basis for a book scrutiny and learning walk focus.

Y1
- Plants
- Animals, including Humans
- Materials
- Seasonal Changes

Y2
- Living Things and their Habitats
- Plants
- Animals, including Humans
- Materials

Y3
- Plants
- Animals, including Humans
- Rocks
- Light
- Forces and Magnets

Y4
- Living Things and their Habitats
- Animals, including Humans
- States of Matter
- Sound
- Electricity

Y5
- Living Things and their Habitats
- Animals, including Humans
- Properties and Changes of Materials
- Earth and Space
- Forces

Y6
- Living Things and their Habitats
- Animals, including Humans
- Evolution and Inheritance
- Light
- Electricity

EYFS

- EYFS Development Matters 2020 & ELGs Understanding the World
- Samples

The EYFS framework is structured very differently to the national curriculum as it is organised across seven areas of learning rather than subject areas. The aim of this document is to help subject leaders to understand how the skills taught across EYFS feed into national curriculum subjects.

This document demonstrates which statements from the 2020 Development Matters are prerequisite skills for science within the national curriculum. The table below outlines the most relevant statements taken from the Early Learning Goals in the EYFS statutory framework and the Development Matters age ranges for Three and Four-Year-Olds and Reception to match the programme of study for science.

The most relevant statements for science are taken from the following areas of learning:

- Communication and Language
- Personal, Social and Emotional Development
- Understanding the World

Science		
Three and Four-Year-Olds	Communication and Language	• Understand 'why' questions, like: "Why do you think the caterpillar got so fat?"
	Personal, Social and Emotional Development	• Make healthy choices about food, drink, activity and toothbrushing.
	Understanding the World	• Use all their senses in hands-on exploration of natural materials. • Explore collections of materials with similar and/or different properties. • Talk about what they see, using a wide vocabulary. • Begin to make sense of their own life-story and family's history. • Explore how things work. • Plant seeds and care for growing plants. • Understand the key features of the life cycle of a plant and an animal. • Begin to understand the need to respect and care for the natural environment and all living things. • Explore and talk about different forces they can feel. • Talk about the differences between materials and changes they notice.
Reception	Communication and Language	• Learn new vocabulary. • Ask questions to find out more and to check what has been said to them. • Articulate their ideas and thoughts in well-formed sentences. • Describe events in some detail. • Use talk to help work out problems and organise thinking and activities, and to explain how things work and why they might happen. • Use new vocabulary in different contexts.

Reception Continued	Personal, Social and Emotional Development		• Know and talk about the different factors that support their overall health and wellbeing: - regular physical activity - healthy eating - toothbrushing - sensible amounts of 'screen time' - having a good sleep routine - being a safe pedestrian
	Understanding the World		• Explore the natural world around them. • Describe what they see, hear and feel while they are outside. • Recognise some environments that are different to the one in which they live. • Understand the effect of changing seasons on the natural world around them.
ELG	Communication and Language	Listening, Attention and Understanding	• Make comments about what they have heard and ask questions to clarify their understanding.
	Personal, Social and Emotional Development	Managing Self	• Manage their own basic hygiene and personal needs, including dressing, going to the toilet and understanding the importance of healthy food choices.
	Understanding the World	The Natural World	• Explore the natural world around them, making observations and drawing pictures of animals and plants. • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

EYFS Development Matters 2020 Statements and ELGs **Understanding the World**

Birth to Three

- Repeat actions that have an effect.
- Explore materials with different properties.
- Explore natural materials, indoors and outside.

- Explore and respond to different natural phenomena in their setting and on trips.

- Make connections between the features of their family and other families.

- Notice differences between people.

Three and Four-Year-Olds

- Use all their senses in hands-on exploration of natural materials.
- Explore collections of materials with similar and/or different properties.
- Talk about what they see, using a wide vocabulary.

- Begin to make sense of their own life-story and family's history.

- Show interest in different occupations.

- Explore how things work.

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

- Explore and talk about different forces they can feel.

- Talk about the differences between materials and changes they notice.

- Continue developing positive attitudes about the differences between people.

- Know that there are different countries in the world and talk about the differences they have experienced or seen in photos.

Children in Reception

- Talk about members of their immediate family and community.

- Name and describe people who are familiar to them.

- Comment on images of familiar situations in the past.

- Compare and contrast characters from stories, including figures from the past.

- Draw information from a simple map.

- Understand that some places are special to members of their community.

- Recognise that people have different beliefs and celebrate special times in different ways.

- Recognise some similarities and differences between life in this country and life in other countries.

- Explore the natural world around them.

- Describe what they see, hear and feel whilst outside.

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

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

Early Learning Goals

Past and Present

- Talk about the lives of the people around them and their roles in society.
- Know some similarities and differences between things in the past and now, drawing on their experiences and what has been read in class.
- Understand the past through settings, characters and events encountered in books read in class and storytelling.

People, Culture and Communities

- Describe their immediate environment using knowledge from observation, discussion, stories, non-fiction texts and maps.
- Know some similarities and differences between different religious and cultural communities in this country, drawing on their experiences and what has been read in class.
- Explain some similarities and differences between life in this country and life in other countries, drawing on knowledge from stories, non-fiction texts and (when appropriate) maps.

The Natural World

- Explore the natural world around them, making observations and drawing pictures of animals and plants.
- Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.
- Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

Seasons

Literacy	Mathematics	Understanding the World	Expressive Arts and Design
• Play a seasons game of 'I Spy' with the children in the outside area. Can the children identify something that begins with the same initial sound? • Write graphemes on seasonal objects, such as conkers, leaves, snowflakes or petals. Invite children to find these amongst other seasonal objects and talk about and recognise the letter. Can they say the sound for the letter? • Place four baskets on the floor, one for each season. Show the children one object at a time, such as a scarf, snowflake, lamb, chick, flower and Easter egg. As you do, clap each syllable of the word and encourage children to copy. Can they sort each object into the correct basket?	• Draw a large outline of a bare tree and use leaves or blossom images to subitise to three. Place up to three leaves or blossom on the tree and ask children to tell you what they notice. • The children can print their lower arm, wrist and hand with brown paint. They can then add a fingerprint on top of each branch and count one to five as they do so. The fingerprints could be in either pink, green, orange or white to represent the different seasons. • Take children on a seasonal walk and then create a linear map to draw and stick things seen or collected on the journey. Can they use the vocabulary 'first', 'next'	• Create a mystery box that is sealed except for two hand holes. Each day, place an exciting seasonal object in the box, such as some conkers, a block of ice or a bare branch. Can children describe and explore the object using their sense of touch? • Explore the cycle of a tree through the seasons. Place four large tree outlines next to each other and provide collage materials in different seasonal colours for the children to decorate each tree. • Children can explore seasonal weather through outdoor activities, such as exploring the force of wind by using simple kites, streamers and flags in the outside area or splashing in puddles and collecting rain.	• Provide collections of natural objects related to your current season. Children can draw from observation, using line and shape to represent the objects. • Explore autumn colour mixing by squirting shaving foam into a tray and adding some yellow and red paint. Children can gently mix the colours by stirring the foam. Gently press a white card leaf into the foam to print an autumn marble effect. • Provide the children with seasonal natural objects, such as flowers, logs, conkers and leaves to print with and explore patterns and textures.

Literacy	Mathematics	Understanding the World	Expressive Arts and Design
• Share Winter Pictures alongside these Winter Word Cards and use them to inspire and collect vocabulary. Encourage children to clap syllables, hear initial sounds and collect rhyming words. • Using the Design a Snowman Activity resource, add a photograph of children's faces on to the snowman. They can then try writing their name on the snowman's tummy and add a hat, a scarf and some buttons. • Fill shallow trays with fake snow and eco-friendly glitter. Invite children to write letters in the snow, using their fingers or a tool.	• Use cotton wool balls to play 'snowball subitising'. Scatter up to three of the snowballs onto a table or the carpet and challenge children to tell you quickly how many there are without counting them. • Use these Snowflake Numbers up to five. Show the children a number. How quickly can they show you that number using their fingers? • Provide circles of white paper and a selection of different coloured paper 2D shapes. Invite children to use the shapes to collage a picture of a snowman.	• Provide the children with different materials, such as fabric, card and foil. Encourage children to explore the materials - which ones would be best for making a coat to keep a teddy warm in winter? • Make Bird Feeders with the children and hang them in your outside area. Observe birds as they come to feed and talk about why we need to feed wildlife in the winter. • Make ice balloons by filling balloons with water and freezing until solid. Add these to your provision together with a range of tools, some paint, salt and water of different temperatures. Invite children to explore and observe as the ice melts.	• Provide a selection of loose parts, such as cotton buds, white paper straws and white and blue beads and pom-poms. Add in Snowflake Pictures and invite children to create their own pictures. • In the painting area, provide white and blue paint, black paper, eco-friendly glitter and white sand or granulated sugar. Invite children to create their own wintry scene and explore the texture and effects they can create by sprinkling glitter or sugar onto their pictures. • Cover boxes of different sizes in white paper and invite children to stack and decorate them in different ways to make a snowman, ice castle or ice monster.

Healthy Teeth

Literacy	Mathematics	Understanding the World	Expressive Arts and Design
• Receive a letter from the Tooth Fairy to introduce the concept of milk teeth falling out. The letter could contain instructions on some tasks to complete, such as the Tooth Fairy treasure hunt or talking to some older children. This Editable Letter from the Tooth Fairy Template may come in handy. • Write a note or letter from the Tooth Fairy asking the children to write instructions for brushing teeth to give to a giant that isn't very good at it. • Create some phoneme cards on teeth shapes for children to practise making CVC or CVCC words by putting them together in a mouth. • Write some CVC/CCVC words on laminated mouth pictures. Can the children read the word then rub it out with a toothbrush?	• Talk about how long you should brush your teeth. Use timers to see what other activities can be done in two minutes. • Use mirrors for the children to look at their own teeth and count them. To extend their thinking, ask questions, such as 'If you had a wobbly tooth and it fell out, how many teeth would be left?' • Provide tooth cut-outs of different sizes for the children to compare and order. • Set up a game to help the Tooth Fairy add up how many teeth she has collected altogether. Can the children record this to help the Tooth Fairy remember? • Create some individual teeth cards with numerals on. Children can then practise their number bonds by matching cards together to total a given amount.	• Look at teeth from different animals. Can children compare them and say why they have different shaped teeth? • Explore different types of toothpaste and invite children to have a go at making their own simple toothpaste from baking soda. • Explore and taste some different foods that help our teeth stay healthy. Please remember to check for allergies before the session. • Look at some x-rays of teeth to discuss how technology is used by a dentist. • Receive a letter from the Tooth Fairy about the countries she visited that night. The children can then explore a world map to plot where the Tooth Fairy went.	• Set up a role-play area as a dentist surgery for children to explore. This Dentist Role-Play Pack has some lovely resources. • Use toothbrushes as a tool for painting. Children can explore the different marks and textures a toothbrush can make. • Children could design and make their own toothbrush. They could think about what material they would make it from or add some fun details to the handle. • Create a giant mouth with teeth from junk-modelling materials. The children can then clean the teeth with a giant toothbrush. • Ask the children what they think the Tooth Fairy looks like. Can they make a model of the Tooth Fairy using a range of materials?

Life Cycle of a Frog

Literacy	Mathematics	Understanding the World	Expressive Arts and Design
• Fergus Frog likes to find things that begin with 'f'. Show the children a collection of objects beginning with 'f', such as feather, fish, fan and football. Invite the children to identify the initial sound and add to Fergus's collection. • Use this Frog Pond Rhyming Words Activity. Jump the frog picture along a line of lily pads to create and explore strings of rhyming words. • In a shallow tray, add a layer of blue-coloured rice or sand. Add some small word frogs too. Children can practise name writing or letter formation using their fingers or a small paintbrush. Can they write all or some of their name?	• Sing the number rhyme Five Little Speckled Frogs. Use some stick puppets or toys to encourage the children to count how many frogs are left on the log each time. • Use some coloured pebbles to create an ABAB repeating pattern. Jump a toy frog along the pebbles as you describe the pattern. Invite children to extend the pattern for the frog to follow. • Encourage children to describe the sequence of events in the life cycle of a frog using words, such as 'first, 'then', 'next' or 'after that'. • Explore positional language using a toy frog. Hide a toy frog in different places for children to describe.	• Visit a local pond and encourage the children to demonstrate respect and care for the natural environment. Invite children to take photos, draw pictures and talk about what they see but remind them to leave the area as they found it so that the frogs and other wildlife can stay safe and happy. • Encourage children to talk about the key features of the life cycle of a frog using these Cut-Outs. Talk about the life cycle as you sequence the cut-outs together. • Hide these Frog Life Cycle Story Stones in a tray of blue rice or sand. Invite the children to uncover the stones and talk about the life cycle. Can they describe the whole cycle using the story stones?	• Invite the children to explore colour mixing by proving blue and yellow paint for the children to mix. Invite children to mix the paints to create different shades of green to paint frog pictures. • In a large activity tray, create a small world pond for children to explore. Invite children to create stories about the life cycle using the scene. • Provide a selection of wooden guiros for children to explore. Invite them to explore how to play the instruments and describe the sounds they make. Can they make a sound like a croaking frog?

Food

Literacy	Mathematics	Understanding the World	Expressive Arts and Design
• Play this Silly Soup phonics game to explore initial sounds. Sort some cards into the bowl that start with the same initial sound. Invite children to identify other items that could also go into the silly soup based on the initial sound. • Explore rhyming words using these Funny Food Rhyming Words. Talk about the rhyming words as you match the cards together. • Provide shapes of ready-to-roll icing along with cake decorating pens. Children can practise writing their names on an icing shape before placing them onto biscuits.	• Sing the number rhyme 'Five Currant Buns'. As they sing, invite children to use their fingers to represent the number of buns left in the shop. • Slice some potatoes in half and trim the cut ends into different 2D shapes. Invite children to dip the potatoes into paint and talk about the shapes they can print. • Provide a balance scale and a variety of real or role-play vegetables for children to weigh, compare and discuss. • In a role-play cake shop, write numerals one to five onto some paper bags and invite children to place the matching number of cakes into each bag.	• In a large activity tray, provide some fruit and vegetables for children to investigate. Provide spoons, bowls, magnifying glasses and large tweezers for children to use as they use their senses to explore the food items. • Create some simple recipes with the children that require heating and/or cooling. For example, popcorn, toast or jelly. Invite children to talk about the differences in the materials and how they change. • Invite a cook or baker into the setting to talk to the children about their job. Encourage the children to ask questions.	• Invite children to explore colours and colour mixing to create shades of paint to use when painting fruit pictures. Look at some fruit and invite children to mix paints to create the colours they need for their favourite fruit. • Set up a teddy bears' picnic area for children to explore. Provide soft toys, plates, cups and role-play food. Invite children to create stories together by creating and using the props. • Provide sheets of paper along with pens or crayons for children to use to design a placemat. Invite children to decorate their placemat, which can then be laminated.

All About Me - My Emotions

Literacy	Mathematics	Understanding the World	Expressive Arts and Design
• Explore picture books to talk about how characters are feeling and encourage children to talk about why they think that. Use this as an opportunity to teach children new vocabulary for different emotions. • Provide children with mirrors and ask them to draw self-portraits of how they are feeling. Encourage children to write the letters of their name next to their picture. • Display some emotions pictures and model clapping the syllables in the name of the emotion for children to identify. For example, one clap for 'sad' or two claps for 'happy'.	• Hide emoji faces around the setting for children to find and describe their location. For example, 'The sad face is under the sand tray.' or 'The happy face is next to the sandpit.' • Set up obstacle courses and ask children to describe their route or provide directions. Encourage children to wait their turn and ensure everyone gets a go. • Provide children with loose parts and these Natural Faces: My Emotions Photo Pack. Talk about shape properties as the children create their own faces. • Use snack time as an opportunity to compare groups. Discuss how sharing the food items makes the children feel when they have more/fewer items than others.	• Encourage children to bring in photos or objects from home to discuss their favourite memories. Children could create a 'special memories' book or treasure box. • Plant seeds and bulbs and ask children to help you to care for these to help them grow. Use it as an opportunity to discuss how they feel when they are helping to care for living things. • Provide children with these I Spy Nature Frames to encourage calming and mindfulness activities. • Play different games, such as 'Apple Pie' or parachute games to help children learn each other's names.	• Teach children this My Feelings Song. As children become familiar with the song, sing it using different voices, such as a sad voice or excited voice. • Provide a range of instruments and noise makers for children to use to create sounds representing different emotions and feelings. • Help children to explore colour mixing and work together to find ways to create different colours. As the children make new colours, ask them how the colours make them feel. Include these Mood Monsters Cards and ask children if they agree with the emotions that the coloured monsters show.

My Body

Literacy	Mathematics	Understanding the World	Expressive Arts and Design
• Explore the words on these Body Parts Flashcards. Can the children hear any words with the same initial sound? Can they clap and count the number of syllables in each word? • There are many suggestions for books with a body theme on this My Body Book List. As you share each story, talk through the different parts of the book, such as the cover, author and page numbers. • Encourage children to write some or all of their name to go with any self-portraits that they draw. They could also make their name using magnetic letters or by using letter stamps in playdough.	• Ask some children to lie down on the floor and help others to lay large building blocks in a line alongside them. How many blocks long are they? Support the group to compare lengths using language of size, such as 'longer' or 'shorter'. • Provide 2D shapes and challenge the children to make a body out of them. Can they describe the shapes they have used for different body parts? • Take photographs of the children's hands showing different finger numbers to five. Use them to create a maths display. • Show the children a numeral card. Can they count out the correct quantity of small world people to match the numeral?	• Share the Twinkl Originals story, 'We Are All Different', which introduces differences between people and helps to develop positive attitudes. Discuss the similarities and differences between children in your group. • Set up a Hairdressers Role-Play Area and provide hair magazines showing a diverse range of hair types and styles. • Ask the children to bring in their baby photos and discuss how their bodies have changed since they were little. What can their bodies do now that they couldn't when they were babies? • Collect natural materials and encourage the children to use them to make self-portraits.	• Make hand and footprints in rainbow-coloured paint or draw around and cut out hands and feet to make a large collage for a wall display. • Provide mirrors and Self-Portrait Frames along with coloured pencils and ask children to draw their own self-portrait. • Learn the My Body Song and perform it for parents or another class. Add percussion instruments for the children to play along with a steady beat. • Provide paper plates, poster paints, googly eyes, wool, white glue and sticky tape. Encourage the children to explore and experiment with the different materials to make a collage face.

Jungle and Rainforest

Literacy	Mathematics	Understanding the World	Expressive Arts and Design
• Children can use phonological awareness to recognise words with the same initial sound on this Jungle-Themed I Spy Activity sheet. • Create a group rainforest tree by asking children to practise writing their name on a Leaf Template. You can then put these together to create a large tree display. • Provide opportunities to look through some jungle-themed topic books, both fiction and non-fiction. In small groups, discuss and explore the five key concepts about print. • Use the 'Rowing in the Jungle' song to explore rhyme. Can children spot which words rhyme? Try missing out the last	• Link numerals and amounts up to five with this Jungle-Themed Count and Colour Sheet. • Look at some photos, fabrics or figures of rainforest animals and talk about the patterns that the children can see. Play a guessing game and ask a child to describe one of the animals by their pattern. They can use informal language such as 'spotty' or covered in 'blobs'. • Extend some ABAB patterns using fingerprints of paint on these Repeating Snake Pattern Sheets. Use the blank version for children to create their own patterns.	• Use all senses when exploring tropical fruit found in a rainforest. Encourage children to be hands-on and touch the fruit, smell it, look at it and then taste it. • Use these Jungle Animals and their Young Picture Matching Cards as a prompt to support children to use a wide vocabulary when talking about what they see while matching the cards together. • Provide the resources needed to plant seeds and care for growing plants. Also explore the plant life cycle, including decay, by observing an old fruit core over time. • Make a collection of natural materials to investigate, such as seeds, bark and leaves. Provide magnifying glasses for children to explore similar or different properties.	• Use an instrument to create a steady beat and encourage children to move like a jungle animal to the rhythm. Prompt children to listen with increased attention to the sounds. For example, if the beat changes speed, they change speed or if the instrument changes, the animal being imitated changes. • Provide junk-modelling materials, masking tape, glue, paperclips and fasteners to join different materials together and create props for jungle-themed story, allowing children to decide what to make. • Give children opportunities to mix colours to match the Jungle Animal Colouring Sheets they are painting. How does black become grey for the elephant? How could red create orange?

Year 1

Y1 PLANTS (BIOLOGY)

Key Question: How can we identify different plants and trees?

Book Hooks:

National Trust: Look What I Found in the Woods
"You Live Where?!" John Hay / Garry Parsons

Overview of Learning

Pupils should use the local environment to explore and answer questions about plants growing in their habitat. They should become familiar with common names of flowers, examples of deciduous and evergreen trees, and plant structures (including leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem).

Knowledge and Understanding Objectives

Pupils should be taught to:

- identify and name a variety of common wild and garden plants, including deciduous and evergreen trees;
- identify and describe the basic structure of a variety of common flowering plants, including trees.

Key Vocabulary to Explain

plant – a living organism
tree - a woody plant
deciduous – a tree that loses its leaves annually
evergreen – a tree the does not lose its leaves
flower – the seed-bearing part of a plant that is usually surrounded by brightly coloured petals
roots – the part of the plant that attaches into the ground for support and nutrient collection
stem – the main stalk of a plant
leaf – part of a plant that is typically flat and hangs on the stem

Stretch and Challenge Across the Curriculum

Use observations in the local environment to compare animals or through videos and photographs. Look at local habitats such as ponds, hedgerows and soil and discuss in groups what plants and animals might live there. Design and make a bird feeder and observe which birds visit. Design and make your own habitat. Nature Reserve Visit. Make a **tally chart**, showing the number of animals found in each place. This information could be transferred to a **bar chart.**

Working Scientifically Objectives

- observe closely, perhaps using magnifying glasses, and comparing familiar plants;
- describe how they were able to identify and group them;
- draw diagrams showing the parts of different plants including trees.
- keep records of how plants have changed over time, for example the leaves falling off trees and buds opening;
- compare what they have found out about different plants.

Previous Learning

- Talk about what they see, using a wide vocabulary.
- Plant seeds and care for growing plants.
- Understand the key features of the life cycle of a plant.
- Begin to understand the need to respect and care for the natural environment and all living things.
- Explore the natural world around them.
- Understand the effect of changing seasons on the natural world around them.

Future Learning

Plants are studied in each year group.
Year 2 – Observe and describe how seeds and bulbs grow into mature plants; find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.
Year 3 – Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers; explore requirements for life and growth and how they vary from plant to plant; investigate the way in which water is transported within plants; explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

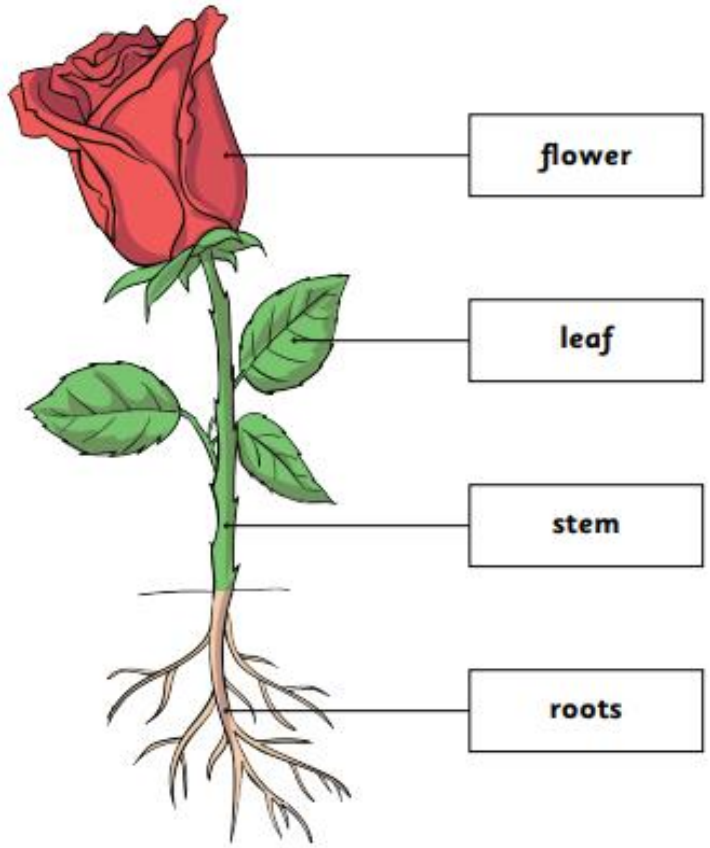
Assessment

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6	Lesson 7	Lesson 8
Key question: What is a plant?	**Key question:** What are the parts of a plant called?	**Key question:** Do plants grow?	**Key question:** Do wild plants grow in our local area?	**Key question:** How can we group plants?	**Key question:** Can we eat plants?	**Key question:** Are trees a type of plant?	**Key question:** What is a leaf?
Learning objective: I can identify different plants.	**Learning objective:** I can identify and describe the basic structure of plants.	**Learning objective:** I understand that plants can grow.	**Learning objective:** I can name a variety of common wild plants.	**Learning objective:** I can sort a variety of plants.	**Learning objective:** I can name a variety of common plants that we can eat.	**Learning objective:** I can identify, name and describe the basic structure of deciduous and evergreen trees.	**Learning objective:** I can identify and classify.
Success criteria: By the end of this lesson, children will be able to identify what a plant is and select plants from a selection of objects.	**Success criteria:** By the end of this lesson, children will be able to label the basic parts of a plant.	**Success criteria:** By the end of this lesson, children will be able to explain that plants grow from different seeds and they continue to grow and change.	**Success criteria:** By the end of this lesson, children will be able to name a variety of plants that grow wildly and search for them in the school grounds/local area.	**Success criteria:** By the end of this lesson, children will be able to sort plants based on their features.	**Success criteria:** By the end of this lesson, children will be able to identify plants that we can eat.	**Success criteria:** By the end of this lesson,children will be able to explain that trees are a type of plant and identify the basic features of a tree. Children will also begin to identify deciduous and evergreen trees.	**Success criteria:** By the end of this lesson, children will be able to identify similarities and differences between different leaves. Children will also be able to sort leaves based on their appearance.

Plants Knowledge Organiser

Parts of a plant



Plants we eat

The plants that we eat are called **fruits and vegetables**.

Fruits and vegetables grow in the **same way** as other plants.

How do plants grow?

Plants grow from **seeds**. Seeds come in all **shapes and sizes**.

How to grow a plant?

First, we need a **plant pot**.

Then, we put **soil** in our pot.

Next, we make a little hole and put our **seed** in.

After that, we **water the soil**. Not too much!

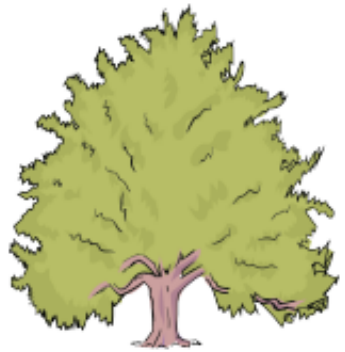
Finally, we leave our pot **somewhere sunny**.

Types of trees

Trees are **types of plants** too.
They grow from **seeds**.
They have **leaves**.
They have **roots**.
They have a big, thick 'stem' called a **trunk**.
Some trees grow **fruits or flowers**.

Deciduous Trees

Deciduous trees **lose their leaves** each year. They grow back again though.

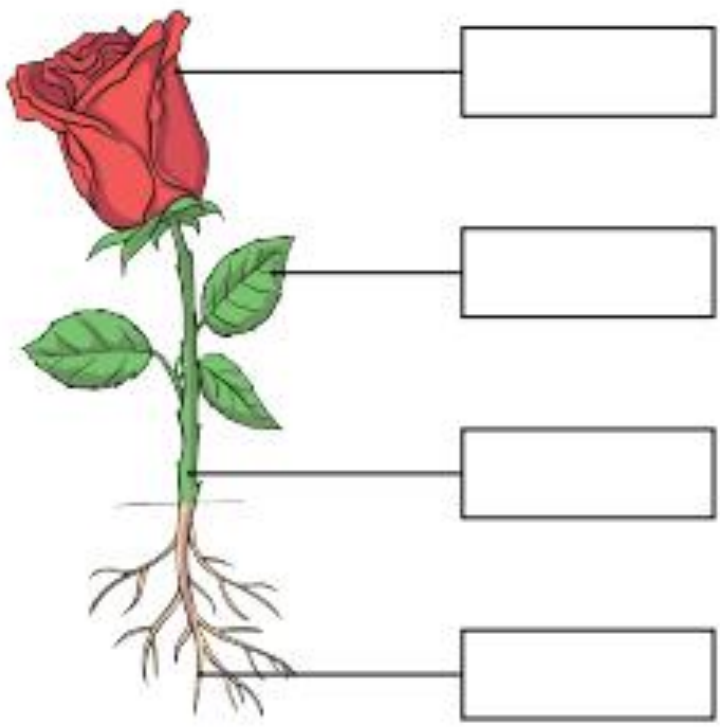


Evergreen Trees

Evergreen trees **don't lose their leaves** at all. They keep them all year round, even in winter.

Plants Mini Quiz

1. Label the different **parts of the plant**.



2. True or false? Trees are a **type of plant**. _____

3. Plants **grow** from _____

4. Which of these are **plants** that we can eat? Circle two answers.

eggs **vegetables** **cats**

fruits **roots**

Y1 ANIMALS INCLUDING HUMANS (BIOLOGY)

Key Question: How do we group animals?

Book Hooks:

Once There Were Giants – Martin Waddell & Penny Dale

Overview of Learning

Pupils should use the local environment to explore and answer questions about animals in their habitat and understand how to take care of animals taken from their environment and the need to return them safely. They should become familiar with the common names of some fish, amphibians, reptiles, birds and mammals, including those that are kept as pets. There should be plenty of opportunities to learn the names of the main body parts. They might work scientifically by using their observations to compare animals at first hand or through videos and photographs, describing how they identify and group them; grouping animals according to what they eat; and using their senses to compare different textures, sounds and smells.

Knowledge and Understanding Objectives

The pupils should be taught:

Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals.

Identify and name a variety of common animals that are carnivores, herbivores and omnivores.

Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets).

Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.

Key Vocabulary to Explain

animal – a living thing
herbivore – an animal that just eats plants
carnivore – an animal that just eats meat
omnivore – an animal that eats both plants and animals
mammal – a type of animal that has hair on its body and drinks milk
bird – a type of animal with feathers, wings and a beak
fish – a type of animal with scales, fins and lives in water
reptile – a type of animal with scales that lives on land
amphibian – a type of animal that is born in water but then develops lungs and lives on land

Assessment

Working Scientifically Objectives

- ask simple questions and recognise that they can be answered in different ways
- observe closely, using simple equipment
- perform simple tests
- identify and classify
- use their observations and ideas to suggest answers to questions
- gather and record data to help in answering questions

Previous Learning

- Talk about what they see, using a wide vocabulary.
- Understand the key features of the life cycle of an animal.
- Begin to understand the need to respect and care for the natural environment and all living things.
- Recognise some environments that are different to the one in which they live.

Future Learning

Animals and humans are studied in each year group.

Year 2 – Notice that animals, including humans, have offspring which grow into adults; find out about and describe the basic needs of animals, including humans, for survival; describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.

Year 3 – Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat; identify that humans and some other animals have skeletons and muscles for support, protection and movement.

Stretch and Challenge Across the Curriculum

Describe how to identify and group animals. Research how to take care of animals taken from the local environment and how to return them safely. Zoo Visit. Use simple secondary sources to find answers to help them sort and classify animals. Use hoops (Venn diagrams) to sort animals, e.g., number of legs, size, where it lives, etc. Use **simple sorting diagrams** to sort and classify objects (animals) into simple groups of their choice and begin to explain why they have sorted them this way. Match images to the correct place on a diagram and create 3 life cycles of their own.

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Key question: What is this animal?	**Key question:** How are animals different?	**Key question:** Do all animals eat the same thing?	**Key question:** What are our body parts called?	**Key question:** What are senses?	**Key question:** Are all humans the same?
Learning objective: I can identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals.	**Learning objective:** I can compare a variety of common animals including fish, amphibians, reptiles, birds and mammals.	**Learning objective:** I can identify and name a variety of common animals that are carnivores, omnivores and herbivores.	**Learning objective:** I can identify, name, draw and label the basic parts of the human body.	**Learning objective:** I can identify which part of the body is associated with each sense.	**Learning objective:** I can compare humans.
Success criteria: By the end of this lesson, children will be able to identify the names of common animals and begin to identify the group to which it belongs based on its features.	**Success criteria:** By the end of this lesson, children will be able to identify the similarities and differences between some common animals using key scientific words to describe features.	**Success criteria:** By the end of this lesson, children will be able to identify that animals do not all eat the same thing. They should begin to identify animals that are herbivores, omnivores and carnivores.	**Success criteria:** By the end of this lesson, children will be able to name different parts of the human body and locate them on themselves when asked.	**Success criteria:** By the end of this lesson, children will be able to discuss the five sense and identify the body part associated with each sense.	**Success criteria:** By the end of this lesson, children will be able to compare similarities and differences of different humans based on their appearance.

Animals including Humans Knowledge Organiser

Grouping animals

Fish

Fish live in **water** and have **gills, scales** and **fins** on their body.

Birds

Birds have **feathers, beaks and wings.** Most birds **can fly.**

Mammals

Mammals have **fur or hair.** They drink **milk** from their mother when they are young.

Amphibians

Amphibians are born in **water** but then develop **lungs** and live on **land.**

Reptiles

Reptiles are **cold-blooded** animals with scales that **live on land.**

Nutrition

Carnivores

Carnivores just eat **other animals** (meat).

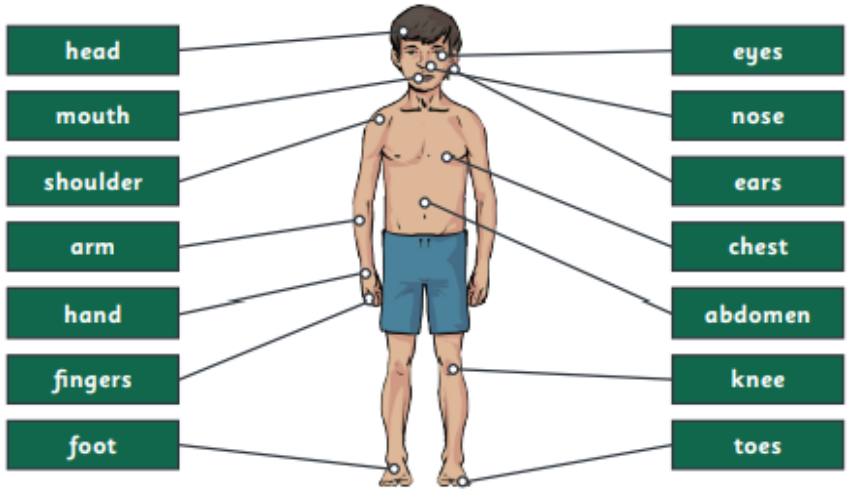
Herbivores

Herbivores just **eat plants.**

Omnivores

Omnivores eat both **plants and meat.**

Body parts



Our senses

We can **see.**
We see with our eyes.

We can **hear.**
We hear with our ears.

We can **touch.**
We touch with our hands.

We can **smell.**
We smell with our nose.

We can **taste.**
We taste with our tongue.

Key Vocabulary

amphibian - an animal that is born in water but later develops lungs and lives on land

animal - a living thing

bird - an animal with feathers, a beak and wings that can usually fly

carnivore - an animal that just eats meat

fish - an animal that lives in the water that has scales, fins and gills

herbivore - an animal that just eats plants

mammal - an animal with fur or hair that feeds on milk from its mother when they are young

omnivore - an animal that eats both plants and meat

reptile - an animal with scales that is cold-blooded and lives on land

senses - something that helps us gather information about the world (sight, hearing, touch, smell and taste)

Y1 Animals including Humans Knowledge Organiser Quiz

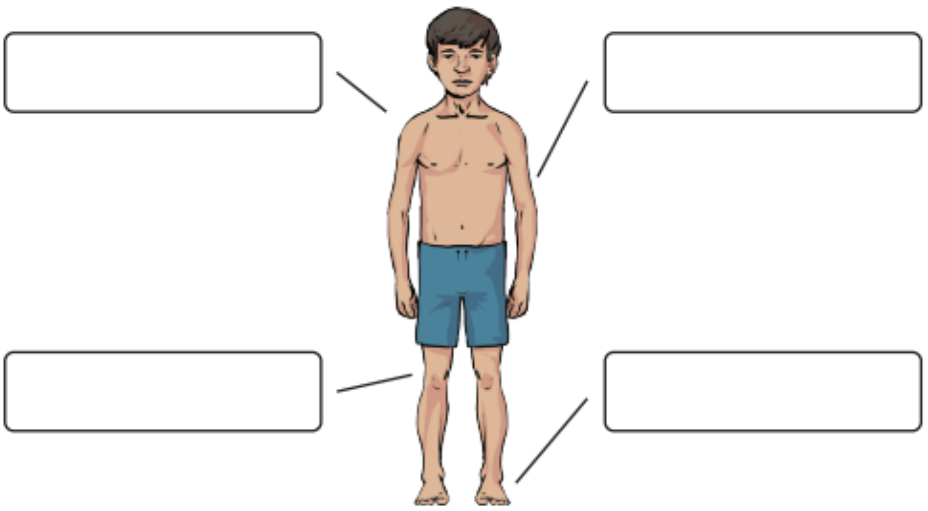
1. True or false?

	True	False
1. A shark is a type **of bird.**	☐	☐
2. A human is **a mammal.**	☐	☐
3. All birds **have feathers.**	☐	☐
4. A reptile **has scales.**	☐	☐

2. Match up the **word** to **its meaning.**

herbivore	**an animal that eats plants and meat**
carnivore	**an animal that just eats meat**
omnivore	**an animal that just eats plants**

3. Label the **body parts.**



Y1 MATERIALS (CHEMISTRY)

Key Question: Why do we use different materials for different things?

Book Hooks:

The Three Little Pigs

Overview of Learning

Pupils should explore, name, discuss and raise and answer questions about everyday materials so that they become familiar with the names of materials and properties such as: hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent. Pupils should explore and experiment with a wide variety of materials, not only those listed in the programme of study, but including for example: brick, paper, fabrics, elastic, foil.

Knowledge and Understanding Objectives

Pupils should be taught to:

- distinguish between an object and the material from which it is made;
- identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock;
- describe the simple physical properties of a variety of everyday materials;
- compare and group together a variety of everyday materials based on their simple physical properties.

Key Vocabulary to Explain

Types of material such as: wood, metal, plastic, glass, rubber, rock, fabric, paper and brick
Words to describe materials such as: hard, soft, rough, bumpy, smooth, fragile, strong, heavy, light

Stretch and Challenge Across the Curriculum

Design and make a rainhat. Using the story of the three little pigs, children could build the three little pig's houses and talk about which one best suit the purpose and why. Sort natural materials from man-made materials. Sort classroom objects according to their properties - bendy/not bendy, hard/soft, transparent/opaque. They record their results on a **simple table**. Use a **table** to order their results and use them to answer the question.

Working Scientifically Objectives

- Perform simple tests to explore questions, for example: 'What is the best material for an umbrella? ...for lining a dog basket? ...for curtains? ...for a bookshelf? ...for a gymnast's leotard?'
- ask simple questions and recognise that they can be answered in different ways
- observe closely, using simple equipment
- identify and classify
- use their observations and ideas to suggest answers to questions
- gather and record data to help in answering questions

Previous Learning

- Use all their senses in hands-on exploration of natural materials.
- Explore collections of materials with similar and/or different properties.
- Talk about what they see, using a wide vocabulary.
- Talk about the differences between materials and changes they notice.

Future Learning

Animals and humans are studied in each year group.
Year 2 – Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for uses; find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.
Year 3 – Compare and group together different kinds of rocks based on their appearance and simple physical properties; describe in simple terms how fossils are formed when things that have lived are trapped within rock; recognise that soils are made from rocks and organic matter.

Assessment

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Key question: What are materials?	**Key question:** How are materials different?	**Key question:** What are objects made from?	**Key question:** How can we sort materials?	**Key question:** Which material would be best for an umbrella?	**Key question:** Which material would be best for curtains?
Learning objective: I can identify a variety of everyday materials.	**Learning objective:** I can describe the physical properties of a variety of everyday materials.	**Learning objective:** I can distinguish between an object and the material from which it is made.	**Learning objective:** I can compare and group together a variety of everyday materials on the basis of their simple physical properties.	**Learning objective:** I can investigate the properties of different materials.	**Learning objective:** I can investigate the properties of different fabrics.
Success criteria: By the end of this lesson, children will be able to identify different materials.	**Success criteria:** By the end of this lesson, children will be able to describe the properties of different materials.	**Success criteria:** By the end of this lesson, children will be able to name objects and name the material from which they are made.	**Success criteria:** By the end of this lesson, children will be able to sort materials based on their physical properties.	**Success criteria:** By the end of this lesson, children will be able to investigate which material would be best to make an umbrella. Children will investigate which materials are waterproof, light and strong.	**Success criteria:** By the end of this lesson, children will be able to investigate which material would be best. Children will investigate which materials are see-through.

Everyday Materials Knowledge Organiser

There are lots of different **types of materials** and they are all good for making different things because they have different **properties.**

Wood

We can make **tables, chairs** and some **toys** from wood because it is **hard.** It can be **rough** or **smooth.**

Metal

We can make **cars, spoons** and some **musical instruments** from metal because it is **hard** and **smooth.** You can't see through it.

Glass

We can make **windows, mirrors** and **glasses** from glass because it hard and see through. It is very **fragile.**

Plastic

We can make **toys** and **food packaging** from **plastic** because it is **smooth** and **strong.** It can be **hard** or **bendy.**

Rubber

We can make **wellington boots, car tyres** and **bouncy balls** from rubber because it is squashy and **waterproof.** You can **bend it.**

Paper

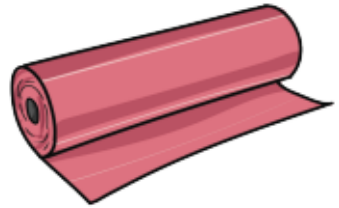
We can make **wrapping paper** and **books** from paper because it is **smooth.** It can tear easily.

Rock

We can make **tiles** and some **jewellery** from rock because it can be **hard.** Some rock can also be **fragile.**

Fabric

We can make **clothes** and **bedding** from fabric because it is **soft.** It is usually **smooth.**



Brick

We can make **buildings** from brick because it is very **hard.** It can be **rough.**

Everyday Materials
mini - quiz

1. Circle two objects that are made from wood.





2. True or false? We make wellington boots from rubber. _____

3. Tick the property that best fits in the sentence.

Fabric is usually...

a) soft ☐

b) strong ☐

c) breakable ☐

4. Circle three properties of glass.

fragile squashy hard

rough see-through smooth

Y1 SEASONAL CHANGES (PHYSICS)

Key Question: Why does the weather change during the different seasons?

Book Hooks:

Tree: Seasons Come, Seasons Go Patricia Hegarty & Britta Teckentrup / Out and About: A First Book of Poems -Shirley Hughes

Overview of Learning

Pupils should observe and talk about changes in the weather and the seasons. ***This topic is best done throughout the year in the appropriate season so children can observe the season first hand. The first four lessons cover the four seasons and can be completed in any order.***

Knowledge and Understanding Objectives

Pupils should be taught to:

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

Key Vocabulary to Explain

spring – the season in which plants begin to grow
summer – the warmest season of the year
autumn – the season in which some trees lose their leaves
winter – the coldest season of the year
rain – when water falls from the clouds
sun – the bright sphere in the sky that provides light and warmth
change – when something is different

Stretch and Challenge Across the Curriculum

Investigate seasons around the world. Draw or write your favourite thing to do in each season. Create a piece of artwork that shows one of the seasons. Write a story set in your favourite season. In autumn, collect leaves and create leaf rubbings.

Working Scientifically Objectives

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

Previous Learning

- Talk about what they see, using a wide vocabulary.
- Begin to understand the need to respect and care for the natural environment and all living things.
- Explore the natural world around them.
- Describe what they see, hear and feel while they are outside.
- Recognise some environments that are different to the one in which they live.
- Understand the effect of changing seasons on the natural world around them.

Future Learning

Animals and humans are studied in each year group.
Year 4 – Children will study the water cycle and how rain is formed.
Year 5 – Children will look at the Earth and how it rotates and tilts causing different weathers and seasons.

Assessment

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Key question: What is spring?	**Key question:** What is summer?	**Key question:** What is autumn?	**Key question:** What is winter?	**Key question:** How does the day change?	**Key question:** How can we keep dry in the rain?
Learning objective: I can observe and describe changes across the four seasons.	**Learning objective:** I can observe and describe changes across the four seasons.	**Learning objective:** I can observe and describe changes across the four seasons.	**Learning objective:** I can observe and describe changes across the four seasons.	**Learning objective:** I can observe how day length varies.	**Learning objective:** I can describe weather associated with the seasons.
Success criteria: By the end of this lesson, children will be able to identify the key characteristics of spring.	**Success criteria:** By the end of this lesson, children will be able to identify the key characteristics of summer.	**Success criteria:** By the end of this lesson, children will be able to identify the key characteristics of autumn.	**Success criteria:** By the end of this lesson, children will be able to identify the key characteristics of winter.	**Success criteria:** By the end of this lesson, children will be able to explain how the length of the day changes throughout the year.	**Success criteria:** By the end of this lesson, children will be able to explain what rain is and investigate the best material to keep someone dry in the rain.

The Seasons

spring summer autumn winter

Each year we experience these **four seasons.**

The seasons are caused because the **Earth is spinning on a tilt.**

spring

Spring is usually in the months **March, April and May.** In spring the days start to get longer and a bit warmer. New plants grow and the **trees grow their leaves back.**

Many animals **have babies** such as birds, cows, sheep and ducks.

summer

Summer is usually in the months **June, July** and **August.** In summer the **days are at their longest** and the **weather is the warmest.**

The trees are **full of leaves.**

autumn

Autumn is usually in the months **September, October** and **November.** In autumn the amount of time it is light becomes less which means it gets **darker earlier.** The leaves start to **change colour** and **fall off the trees.**

winter

Winter is usually in the months **December, January** and **February.** In winter we have colder weather, **sometimes snow** and frost. The trees have no leaves and the amount of time it is light during the **day is at its shortest.**

sun

rain

wind

snow

thunderstorm

Seasonal changes mini quiz

1. Fill in the missing seasons.

spring, _____, autumn, _____

2. True or false?

It usually snows in summer. _____

3. Which season do plants lose their leaves?

_____

4. Circle the three months that are usually in autumn.

☐ September	☐ November	☐ August
☐ January	☐ October	☐ March

Year 2

Y2 LIVING THINGS AND THEIR HABITATS (BIOLOGY)

Key Question: How do we know something is alive?

Book Hooks:

Meerkat Mail – Emily Gravett

Overview of Learning

Pupils will be introduced to the idea that all living things have certain characteristics that are essential for keeping them alive and healthy. They will become familiar with the life processes that are common to all living things. They will explore the local environment to identify and study a variety of plants and animals within their habitat and observe how living things depend on each other. They will compare animals in familiar habitats with animals found in less familiar habitats, for example, on the seashore, in woodland, in the ocean, in the rainforest. They will also look at microhabitats and identify some animals that may live there.

Knowledge and Understanding Objectives

The pupils should be taught:

- explore and compare the differences between things that are living, dead, and things that have never been alive;
- identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other;
- identify and name a variety of plants and animals in their habitats, including microhabitats;
- describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.

Key Vocabulary to Explain

alive – something that is living
dead – something that was living but is not anymore
living – something that is alive
habitat – the place in which a living thing lives
microhabitat – a small habitat
conditions – the state of something
adapted – how something is adjusted
food chain – a series of living things that feed from each other

Working Scientifically Objectives

- sort and classify things according to whether they are living, dead or were never alive;
- record findings using charts;
- describe how they decided where to place things, exploring questions for example: 'Is a flame alive? Is a deciduous tree dead in winter?'
- talk about ways of answering their questions;

Previous Learning

- Studied different animals and grouped them based on their features and diet.

Future Learning

Year 3 – identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat; identify that humans and some other animals have skeletons and muscles for support, protection and movement.
Year 4 - Recognise that living things can be grouped in a variety of ways; explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment; recognise that environments can change and that this can sometimes pose dangers to living things.

Stretch and Challenge Across the Curriculum

Construct a simple food chain that includes humans (e.g., grass, cow, human). Describe the conditions in different habitats and micro-habitats and find out how the conditions affect the number of plants and animals that live there. Why do you think that is? Discuss how the minibeasts help keep the microhabitat healthy. Observe carefully a microhabitat and sketch the plants you find. Can you find any evidence of plants being eaten? What other living things can you see? Go on a minibeast hunt. What minibeasts can you find? Why can they survive in their habitat? Create a **tally chart** or **pictogram / block graph** to show your results. Create a simple fact file about a group of animals or plants to explain what they have in common. Andy Goldsworthy – art and the connection with nature.

Assessment

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Key question: Is it living, dead or never been alive?	**Key question:** What is a microhabitat?	**Key question:** How are habitats different around the world?	**Key question:** What conditions do woodlice prefer?	**Key question:** How are living things adapted to their habitat?	**Key question:** What is a food chain?
Learning objective: I can explore and compare the differences between things that are living, dead, and things that have never been alive.	**Learning objective:** I can identify and name a variety of plants and animals in their habitats, including microhabitats.	**Learning objective:** I can identify and name a variety of plants and animals in their habitats.	**Learning objective:** I can observe closely and use my observations to answer questions.	**Learning objective:** I can identify that most living things live in a habitat to which they are suited.	**Learning objective:** I can construct a simple food chain.
Success criteria: By the end of this lesson, children will be able to identify living things and things that have never been alive.	**Success criteria:** By the end of this lesson, children will be able to identify different microhabitats in their local area and identify living things that might live there.	**Success criteria:** By the end of this lesson, children will be able to identify large habitats around the world, identify differences and identify living things that might live there.	**Success criteria:** By the end of this lesson, children will be able to plan and carry out an investigation to find out which conditions woodlice prefer.	**Success criteria:** By the end of this lesson, children will be able to identify characteristi cs that some living things have that make them best suited to the environment they live in.	**Success criteria:** By the end of this lesson, children will be able to identify what some living things from a habitat eat and how they are linked in a food chain.

Living Things & their Habitats

Key Vocabulary

There are seven things that all **living** things do, we call these life processes. All animals, including **humans,** do these and **plants** do too! We can remember them with the help of **Mrs Gren!**

Movement
Reproduction
Sensitivity

Growth
Reproduce
Excretion
Nutrition

Living, not living or never alive?

Roast chicken is **dead** because it was alive but isn't anymore.

A pig is **living.**

A camera is **not a living thing.**

Habitats

A habitat is where a living thing lives. Habitats provide things that living things need for the life processes such **as food, water and air.**

Examples of micro-habitats:

- flower beds
- trees
- bushes
- under rocks/logs
- ponds
- in the grass

Examples of large habitats:

- desert
- mountains
- polar regions
- jungle
- ocean
- savannah

Grouping animals

We can group animals depending on what **type of food they eat.**

Herbivores just eat plants.
A rabbit is a herbivore.

Carnivores just eat meat.
A shark is a carnivore.

Omnivores eat both plants and meat.
A gorilla is an omnivore.

Food chains

Sometimes, scientists use food chains to show **what different animals eat in a habitat.** This is a simple **food chain:**

The arrows mean **'is eaten by'.**
The grass is eaten by the rabbit. The **rabbit is eaten by the fox.**

Key Vocabulary

carnivore - an animal that just eats meat

change - when something becomes different

diet - the food that an animal eats

excretion - to dispose of waste

food chain - a diagram that scientists use to show what different animals eat within a habitat

growth - to get bigger

habitat - where a living thing lives

herbivore - an animal that just eats plants

movement - to change position

nutrition - the food we eat

offspring - the babies that an animal produces

omnivore - an animal that eats both plants and meat

reproduction - producing offspring

respiration - taking in gas and giving out another (breathing in humans)

sensitivity - using your senses (see, smell, hear, touch, taste)

Living Things and their Habitats Mini Quiz

1. We can use Mrs Gren to help us remember the **seven life processes.**
   Can you fill in the missing gaps?

Respiration
Sensitivity
Reproduction
Excretion

2. True or false?

A herbivore is an animal that eats both plants and meat. _____

3. Name **a micro-habitat.** _____

4. Name **a large habitat.** _____

5. Why are **habitats** important to living things? _____

_____

6. Look at **the food chain** and complete the sentences below.

Grass is **eaten by the** _____

The rabbit is _____ the fox.

Y2 PLANTS (BIOLOGY)

Key Question: How do seeds and bulbs grow into healthy plants?

Book Hooks:

The Weed – Quentin Blake
The Extraordinary Gardener – Sam Boughton

Overview of Learning

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

Knowledge and Understanding Objectives

Pupils should be taught to:

- observe and describe how seeds and bulbs grow into mature plants;
- find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.

Key Vocabulary to Explain

plant – a living organism
tree – a woody plant
flower – the seed-bearing part of a plant that is usually surrounded by brightly coloured petals
roots – the part of the plant that attaches into the ground for support and nutrient collection
stem – the main stalk of a plant
leaf – part of a plant that is typically flat and hangs off the stem
seed – a small part of a plant that can grow another plant
bulb – a fleshy base of a plant that can grow another plant

Stretch and Challenge Across the Curriculum

Go on a plant/tree hunt. What do you notice about what they look like? What are their features? Explain how plants are suited to their habitats. Choose a plant and create a fact file. Use a **simple table** to sort living, dead and non-living. **Use simple tables** to record measurements.

Working Scientifically Objectives

- observe and record, with some accuracy, the growth of a variety of plants as they change over time from a seed or bulb;
- observe similar plants at different stages of growth;
- set up a comparative test to show that plants need light and water to stay healthy;
- ask simple questions and recognise that they can be answered in different ways;
- observe closely, using simple equipment;
- identify and classify;
- use their observations and ideas to suggest answers to questions;
- gather and record data to help in answering questions.

Previous Learning

- identify and name a variety of common wild and garden plants, including deciduous and evergreen trees;
- identify and describe the basic structure of a variety of common flowering plants, including trees.

Future Learning

Plants are studied in each year group.
Year 4 – recognise that living things can be grouped in a variety of ways; explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment; recognise that environments can change and that this can sometimes pose dangers to living things.
Year 4 –

Assessment

Unit Overview

Key question: Which plants can we eat?	**Key question:** Are all seeds the same?	**Key question:** What do plants need?	**Key question:** Where will they grow?	**Key question:** How do plants grow and change?
Learning objective: I can identify that fruit, vegetables and herbs are a type of plant that we eat.	**Learning objective:** I can observe and describe how seeds grow into mature plants.	**Learning objective:** I know what plants need to grow and stay healthy.	**Learning objective:** I know what plants need to grow and stay healthy.	**Learning objective:** I can explain the life cycle of plants.
Success criteria: By the end of this lesson, children will be able to name a variety of different plants that we can eat.	**Success criteria:** By the end of this lesson, children will be able to describe differences and similarities in different plant seeds.	**Success criteria:** By the end of this lesson, children will be able to identify what plants need to grow and explain what we need to do to keep them healthy.	**Success criteria:** By the end of this lesson, children will be able to plan an investigation to find where the best place is to grow cress seeds.	**Success criteria:** By the end of this lesson, children will be able to explain how plants grow and change throughout their life cycle.

Plants Knowledge Organiser

Plants are **living things**. They **move**, take in and give out **gases**, are **sensitive**, **grow**, **reproduce**, get rid of **waste** and consume **nutrients**. These are all types of **plants**.





Plants we eat

There are some plants that **we can eat**. **Fruits** and **vegetables** grow as part of a plant. **Herbs** are a plant too.


How do plants grow?

We use **seeds** to grow new plants. New seeds grow as **part of the plant**. Seeds can be found **inside some fruits**.

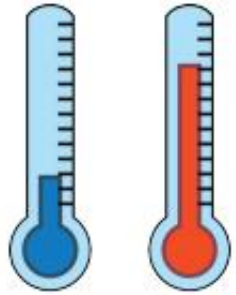

What do plants need?

Plants need things in order to **grow** and **be healthy**.

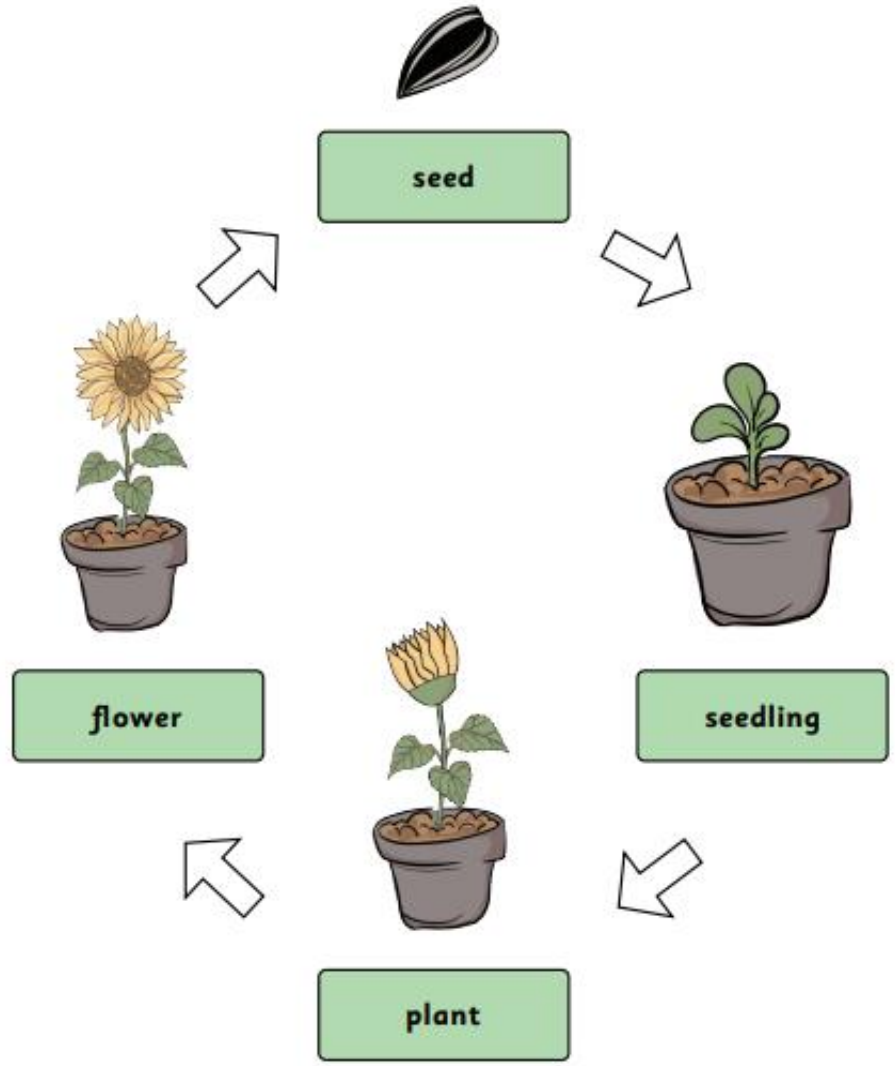
They need **water**.

They need **sunlight**.

They need to be kept at a **suitable temperature**.



Plant life cycle



Plants Mini Quiz

1. Name three different **types of plant**.

   1. _____

   2. _____

   3. _____

2. Name two different **plants that we can eat**.

   1. _____

   2. _____

3. True or false? Herbs are a **plant that we can eat**. _____

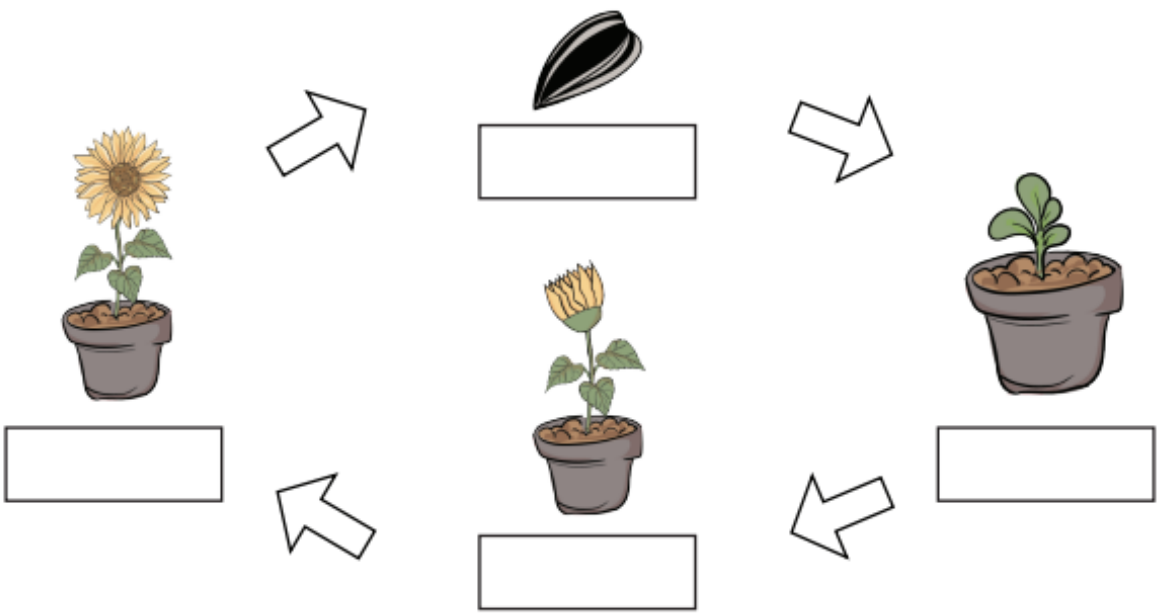
4. True or false? Plants are **not living things**. _____

5. What three things do plants need to be able **grow** and **be healthy**?

_____

_____

6. Label the different parts of the **sunflower life cycle.**



Y2 ANIMALS INCLUDING HUMANS (BIOLOGY)

Key Question: Why do we need to keep healthy?

Book Hooks:

Tadpole's Promise – Jeanne Willis
Monkey Puzzle – Julia Donaldson

Overview of Learning

Pupils will be introduced to the basic needs of animals for survival, as well as the importance of exercise and nutrition for humans. They will also be introduced to the processes of reproduction and growth in animals. The focus at this stage will be on questions that help pupils to recognise growth.

Knowledge and Understanding Objectives

Pupils should be taught to:

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

Key Vocabulary to Explain

basic needs – the things humans need to survive
diet – the food we eat
exercise – moving our bodies
hygiene - keeping clean
illness – when we do not feel well/ feel sick/ have a disease
medicine – something we might take to feel better
offspring – the babies of an animal
seven basic needs – movement, respiration, sensitivity, growth, reproduction, excretion and nutrition survive – to live

Stretch and Challenge Across the Curriculum

Investigate how animals are cared for in zoos and farms. Nature Reserve / RSPCA Visit. Research animal charities, such as the RSPCA, and how they keep animals safe. Write an instruction text about how to look after pets. Research the career of a vet. Compare and contrast offspring to their parents. Compare the heights/hand spans of people at different stages of their lives. Explain their findings verbally, through writing, and in age-appropriate graphic form: block diagrams, pictograms, simple tables.

Working Scientifically Objectives

- ask simple questions and recognise that they can be answered in different ways;
- observe closely, using simple equipment;
- perform simple tests;
- identify and classify;
- use their observations and ideas to suggest answers to questions;
- gather and record data to help in answering questions.

Previous Learning

- Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals.
- Identify and name a variety of common animals that are carnivores, herbivores and omnivores.
- Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets).
- Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.

Future Learning

Year 3 – identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat; identify that humans and some other animals have skeletons and muscles for support, protection and movement.
Year 4 – describe the simple functions of the basic parts of the digestive system in humans; identify the different types of teeth in humans and their simple functions; construct and interpret a variety of food chains, identifying producers, predators and prey.

Assessment

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6	Lesson 7	Lesson 8
Key question: What do humans need?	**Key question:** What are offspring?	**Key question:** How do animals change as they grow into adults?	**Key question:** Do we all grow the same?	**Key question:** Do we need to exercise?	**Key question:** What is a healthy diet?	**Key question:** Why do we need to have good hygiene?	**Key question:** How can we feel better when we are ill?
Learning objective: I can find out about and describe the basic needs of animals, including humans, for survival.	**Learning objective:** I notice that animals, including humans have offspring which grow into adults.	**Learning objective:** I notice that animals, including humans have offspring which grow into adults.	**Learning objective:** I can gather and record data.	**Learning objective:** I can describe the importance for humans to exercise.	**Learning objective:** I can describe the importance for humans to eat the right amounts of different types of food.	**Learning objective:** I can describe the importance for humans to have good hygiene.	**Learning objective:** I can describe the importance for humans to look after themselves.
Success criteria: By the end of this lesson, children will be able to identify and explain the basic needs that humans need to survive.	**Success criteria:** By the end of this lesson, children will be able to identify the offspring of key animals.	**Success criteria:** By the end of this lesson, children will be able to explain how animals have babies and that they grow and change into adults.	**Success criteria:** By the end of this lesson, children will be able to plan and carry out an investigation to answer a given question.	**Success criteria:** By the end of this lesson, children will be able to explain why it is important for humans to exercise regularly.	**Success criteria:** By the end of this lesson, children will be able to describe a healthy diet for humans and explain the importance of eating a healthy diet.	**Success criteria:** By the end of this lesson, children will be able to explain how humans can have good hygiene and the importance of good hygiene.	**Success criteria:** By the end of this lesson, children will be able to identify things we can do to prevent illness and explain what we can do to feel better if we do become ill.

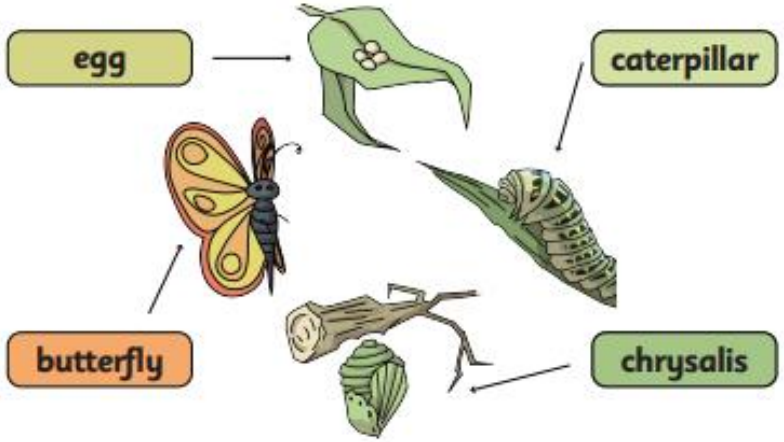
Animals including Humans Knowledge Organiser

All living things **have basic needs.**
They all need **food, water** and **air to survive.**

How humans change

baby | child | teenager | adult | senior

The life cycle of a butterfly

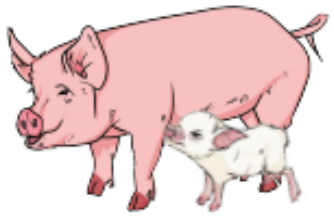


How can we look after ourselves?

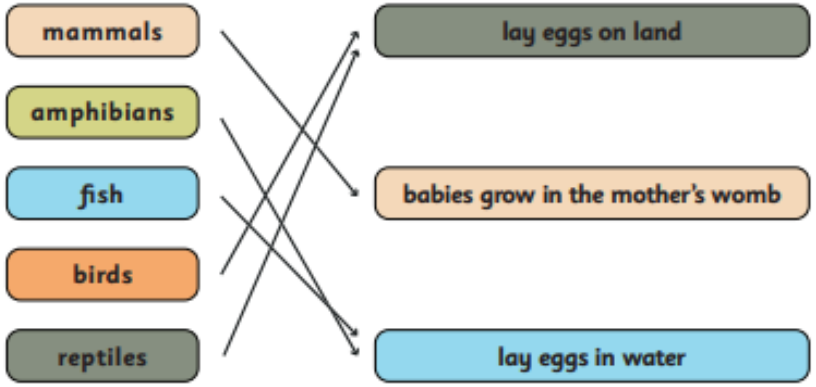
We can **exercise regularly,** eat **a healthy diet**
and make sure we have **good hygiene.**

Offspring

All animals including **humans reproduce** and **have offspring.** This means they make another one of the **same species.**



How do different animals **produce their offspring?**



Key Vocabulary

basic needs - the important things that animals need to survive (air, water and food)

change - when something becomes different

diet - the food that an animal eats

exercise - when you complete an activity that increases your heart rate

healthy - good for you

hygiene - being clean in order to prevent illnesses

life cycle - the stages an animal goes through throughout their life

offspring - the babies that an animal produces

reproduce - to produce offspring

species - a group

survive - to stay alive

Y2 Animals including Humans Knowledge Organiser Quiz

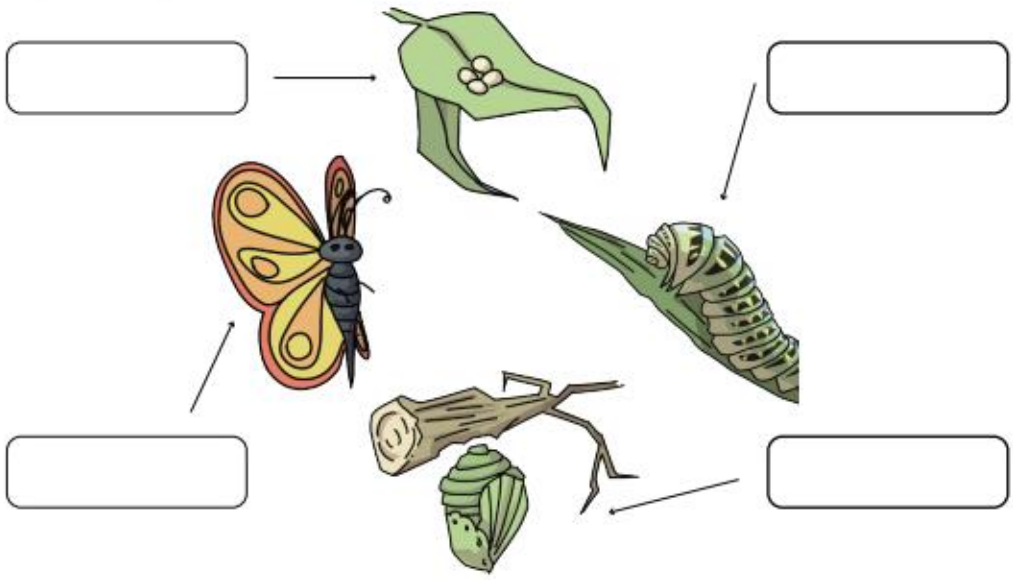
1. What are the three things that **all living things need?**

_____

2. Which of these is not a stage in the **human life cycle?**

baby | kitten | adult | teenager

3. Label the different stages of the **butterfly life cycle.**



4. True or false?

We should **exercise regularly** to look **after our bodies.**

True ☐ False ☐

5. What does the word **'offspring' mean?** _____

6. Which groups of animals lay their **eggs in water?** Tick the two correct answers.

- ☐ mammals
- ☐ amphibians
- ☐ reptiles
- ☐ fish
- ☐ birds

Y2 MATERIALS (CHEMISTRY)

Key Question: How are materials chosen in design?

Book Hooks:

Rosie Revere the Engineer – Andrea Beaty

Overview of Learning

Pupils will identify and discuss the uses of different everyday materials so that they become familiar with how some materials are used for more than one thing or different materials are used for the same thing. They will think about the properties of materials that make them suitable or unsuitable for purposes and they will be encouraged to think about unusual and creative uses for everyday materials.

Knowledge and Understanding Objectives

Pupils should be taught to:

- identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses;
- find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.

Key Vocabulary to Explain

Material - the matter from which a thing is or can be made.
Types of material such as: wood, metal, plastic, glass, rubber, rock, fabric, paper and brick
Words to describe materials such as: hard, soft, rough, bumpy, smooth, fragile, strong, heavy, light

Stretch and Challenge Across the Curriculum

Find out about people who have developed useful new materials, for example John Dunlop, Charles Macintosh or John McAdam. Compare the uses of everyday materials in and around the school with materials found in other places (at home, the journey to school, on visits, and in stories, rhymes and songs). Look at objects, identify the materials they are made from, and explain why they are suitable in each situation. Sort using a **Venn diagram**. **Make jottings** of your observations. **Use tables** to record results. Take simple measurements. Draw labelled diagrams as part of your planning ideas to show what you will use and how. Choose the right material for different situations. Draw a picture and explain their reasons. Identify the main materials of classroom objects and draw pictures of them, grouping by material.

Working Scientifically Objectives

- observing closely, identifying and classifying the uses of different materials, and recording their observations.
- ask simple questions and recognise that they can be answered in different ways;
- observe closely, using simple equipment;
- perform simple tests;
- identify and classify;
- use their observations and ideas to suggest answers to questions;
- gather and record data to help in answering questions.

Previous Learning

- Use all their senses in hands-on exploration of natural materials.
- Explore collections of materials with similar and/or different properties.
- Talk about what they see, using a wide vocabulary.
- Talk about the differences between materials and changes they notice.

Future Learning

Animals and humans are studied in each year group.
Year 3 – Compare and group together different kinds of rocks based on their appearance and simple physical properties; describe in simple terms how fossils are formed when things that have lived are trapped within rock; recognise that soils are made from rocks and organic matter.
Year 4 – Study 'States of Matter' and look at a variety of solids, liquids and gases.

Assessment

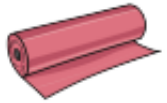
Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5
Key question: What are materials?	**Key question:** What are things made from?	**Key question:** Which material should the pigs make their house from?	**Key question:** Which material will protect Humpty Dumpty?	**Key question:** How can we change materials?
Learning objective: I can identify a variety of everyday materials.	**Learning objective:** I can distinguish between an object and the material it is made from.	**Learning objective:** I can investigate the properties of different materials.	**Learning objective:** Which material will protect Humpty Dumpty?	**Learning objective:** I can investigate the properties of different materials.
Success criteria: By the end of this lesson, children will be able to identify and describe different materials.	**Success criteria:** By the end of this lesson, children will be able to identify a variety of everyday items and the material from which it is made.	**Success criteria:** By the end of this lesson, children will be able to identify the best material to make a house by comparing different materials.	**Success criteria:** By the end of this lesson, children will be able to identify the best material to protect an egg from breaking when dropped.	**Success criteria:** By the end of this lesson, children will be able to identify different materials that we can change by squashing, bending, twisting and stretching.

Materials Knowledge Organiser

All of these **materials** are fantastic. They are each perfectly suited to make **certain objects.**
Depending on the task, some materials **are better suited** than others.

rock



fabric

paper

brick

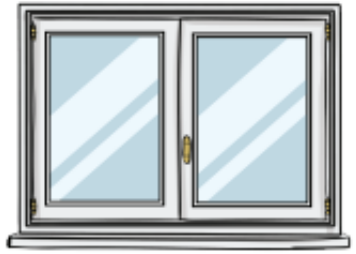
wood

rubber

glass

plastic

metal



This is **a window.** Windows are made from **glass.** Glass is see-through which makes it a good material for the window as it lets **light** into your house and allows you to see out. The glass also stops **rain** and wind entering your **house.**

This is a pair of **wellington boots.** They are made from **rubber.**
Rubber is **strong, waterproof** and **bendy** which makes it a good material for wellies. They will be **comfy** on your feet, keep your feet **dry** and not damage easily.

Changing the shape of materials

We can change the shape of some **objects** by —

squashing them

bending them

twisting them

and stretching them.

It is useful to be able to **change the shape** of some materials.

Fabric needs to be stretchy so that clothes fit our bodies. Imagine if socks weren't **stretchy!**

Some materials cannot be changed which is also useful.

Brick needs to be **strong and firm.** Imagine if bricks for houses were **bendy!**

Key Vocabulary

brick - a hard, strong and rough material used to build houses

fabric - a soft material used to make clothes

glass - a hard but fragile material that is usually transparent and is used to make windows

material - the matter from which an object is made

metal - a material used to make cars, cutlery and some musical instruments; it is usually strong, hard and shiny

paper - a material that can easily tear used to make books and wrapping paper

plastic - a material used to make bottles, toys and food packaging; it can be strong, but some plastics can also be squashed

properties - a characteristic of something

rock - a strong and hard material used to make roof tiles

rubber - a bendy material used to make car tyres and wellington boots

wood - a material made from trees that is used to make furniture

Y2 Materials Knowledge Organiser Quiz

1. True or false?

		True	False
1.	Brick **is soft.**	☐	☐
2.	Glass **is fragile.**	☐	☐
3.	Rubber **is flexible.**	☐	☐
4.	Paper **is waterproof.**	☐	☐

2. Match up the word to its meaning.

metal	A **material** that can easily tear used to make **books** and **wrapping paper**
fabric	A **soft material** used to **make clothes**
paper	A **material** used to make **cars, cutlery** and some **musical instruments;** it is usually strong, hard and shiny

3. How can we change the shape of some materials?

We can _____ them.

We can _____ them.

We can _____ them.

We can _____ them.

Year 3

Y3 PLANTS (BIOLOGY)

Key Question: How does each part of the plant fulfil its function?

Book Hooks:

George and Flora's Secret Garden – Jo Elworthy
Dandelion Seed – Joseph Anthony

Overview of Learning

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

Knowledge and Understanding Objectives

Pupils should be taught to:

- Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers;
- explore requirements for life and growth and how they vary from plant to plant;
- investigate the way in which water is transported within plants;
- explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

Key Vocabulary to Explain

plant – a living organism
tree – a woody plant
flower – the seed bearing part of a plant that is usually surrounded by brightly coloured petals
roots – the part of the plant that attaches into the ground for support and nutrient collection
stem – the main stalk of a plant
leaf – part of a plant that is typically flat and hangs on the stem
seed – a small part of a plant that can grow another plant
bulb – a fleshy base of a plant that can grow another plant
nutrients – something that provides nourishment to a living thing
pollination – the transfer of pollen to allow fertilisation
formation – to create dispersal – to distribute or spread over a wide area

Assessment

Working Scientifically Objectives

- ask relevant questions and using different types of scientific enquiries to answer them;
- compare the effect of different factors on plant growth - the amount of light, the amount of fertiliser;
- make systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers;
- record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables;
- report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.

Previous Learning

- observe and describe how seeds and bulbs grow into mature plants;
- find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.

Future Learning

Plants are studied in each year group.
Year 4 – recognise that living things can be grouped in a variety of ways; explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment; recognise that environments can change and that this can sometimes pose dangers to living things.
Year 5 – Look at the life cycle of a plant including the life process of reproduction.

Stretch and Challenge Across the Curriculum

Label a diagram of a flowering plant. Explain the function of the flower, stem, leaves and roots. Create a **life cycle diagram**, writing and drawing their own explanations. Dissect fruits to observe their structure and use this to explain how seeds are dispersed. Dissect a flower and identify each of the different parts that help with fertilisation. Draw and label the life cycle of a plant. Take part in looking after the school garden. Invite a gardener in for the children to ask questions. Over the course of 4 weeks, compare the growth of a tomato plant, a cactus plant, and cress when grown in sand rather than compost. Identify the variable, make a series of observational drawings and explain what happened. Predict and measure how long it takes for coloured liquid takes to rise. Using technical vocabulary, make basic evaluations about their prediction e.g., was it reasonable? and methodology e.g., was it difficult to measure? **Use measurements** to complete a **line graph** showing the growth of all plants. Read about insect pollination and create a process description writing in their own words.

Unit Overview

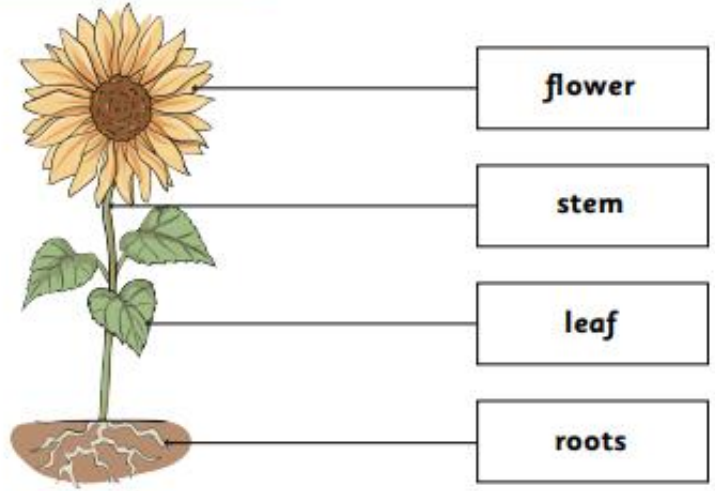
Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Key question: What do plants need?	**Key question:** Do the different parts of the plant have a function?	**Key question:** What are roots?	**Key question:** How do plants transport water?	**Key question:** How do plants reproduce?	**Key question:** How are seeds dispersed?
Learning objective: I can explore the requirements of plants for life and growth.	**Learning objective:** I can identify, locate and describe the function of different parts of flowering plants.	**Learning objective:** I can identify, locate and describe the function of the roots in plants.	**Learning objective:** I can investigate the way in which water is transported within plants.	**Learning objective:** I can explore the part that flowers play in the life cycle of flowering plants, including pollination.	**Learning objective:** I can explore the part that flowers play in the life cycle of flowering plants, including seed formation and seed dispersal.
Success criteria: By the end of this lesson, children will be able to plan an investigation to see what plants need to grow.	**Success criteria:** By the end of this lesson, children will be able to identify the different parts of the plants and explain their function.	**Success criteria:** By the end of this lesson, children will be able to identify where the roots are on different plants and explain their function.	**Success criteria:** By the end of this lesson, children will be able to plan and carry out an investigation to explore how water is transported through plants.	**Success criteria:** By the end of this lesson, children will be able to identify the parts of a flowering plant that play a part in pollination.	**Success criteria:** By the end of this lesson, children will be able to explain how seeds are formed in flowering plants and describe the different ways in which they can be dispersed.

Plants Knowledge Organiser

To grow, plants need:

- water
- nutrients from the soil
- light
- air
- room to grow

Parts of a plant



Roots

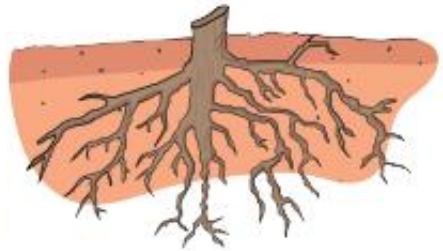
The roots have **different jobs**:

They take up **water** and **nutrients** from the soil.

They keep the plant **steady**.

They keep the plant **upright**.

They "**anchor**" the plant.

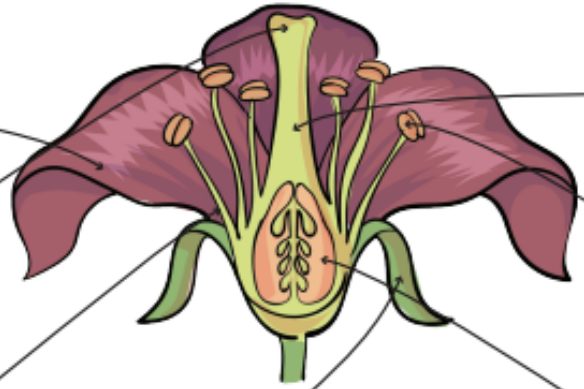


Stem

The job of the stem is to **transport** water and nutrients from the soil to the leaves, flowers or fruit through tiny, thin tubes called the **xylem**.

Flower

The flower's main job is to create new seeds.



petal

brightly coloured to attract **insects**

stigma

sticky to catch the **pollen** grains

filament

holds the **anther** up

sepal

protects the **flower** when it starts to grow

style

holds up the **stigma** as pollen travels down it to the **ovary**

anther

contains the **pollen**

ovary

where the **seeds** are formed

Pollination

Pollination needs to happen to make seeds.

Pollination is when **pollen** from the **anther** is transferred to the **stigma**.

This can happen in **different ways**:

Wind can **blow pollen** from one plant to another. **Pollinators** such as **bees** and **butterflies** visit flowers to drink nectar. When they are there, pollen sticks to them, and they then **transfer** that pollen to the **next flower**.

Once the **pollen** is transferred to the stigma, it travels down the style to the ovary, where the **seed grows**.

Seed dispersal

The **seeds** that have grown need to be **dispersed** to grow into new plants.

This can happen in **different ways**:

Explosion – some plants explode, making the seeds scatter.

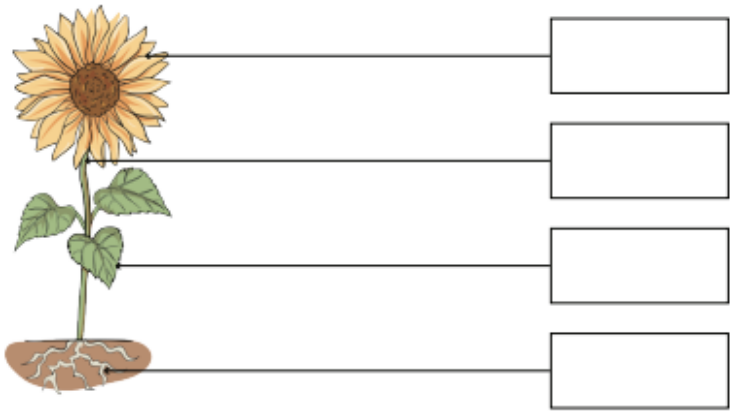
Water – some plants that grow near water have seeds that float. Water will carry the seed until it is washed up.

Animals – some animals eat the fruit containing the seeds. When the animal excretes the waste, they also get rid of the seeds.

Wind – some seeds are light enough to be blown away and carried by the wind.

Plants Mini Quiz

1. Label the **four parts** of a plant.



2. Which of these does a plant **NOT need** to grow?

water **light** **room to grow** **heat**

3. True or false? The **tiny, thin tubes** inside the stem are called the **xylem**. _____

Describe a way in which a plant can **disperse seeds**.

_____

_____

_____

5. Name **two ways** in which **pollination** can take place.

_____ _____

6. Match the parts of a **flower** to its function.

petal	**anther**	**filament**	**ovary**	**style**	**stigma**

sticky to catch the **pollen** grains.	holds the **anther** up	brightly coloured to attract **insects**	holds up the stigma as **pollen** travels down it to the **ovary**	contains the **pollen**	where the **seeds** are formed

Y3 ANIMALS INCLUDING HUMANS (BIOLOGY)

Key Question: How do the systems inside our body work to make a healthy human?

Book Hooks:

Professor Astro Cat's Human Body Odyssey - Dominic Walliman & Ben Newman

Overview of Learning

Pupils will continue to learn about the importance of nutrition and will be introduced to the main body parts associated with the skeleton and muscles, finding out how different parts of the body have special functions.

Knowledge and Understanding Objectives

Pupils should be taught to:

- identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food;
- they get nutrition from what they eat;
- identify that humans and some other animals have skeletons and muscles for support, protection and movement.

Key Vocabulary to Explain

nutrition – food or nourishment
skeleton – the framework of bones that supports the body of an animal
muscles – a bundle of tissue in the body of an animal that can contract enabling movement
healthy – good for your health
unhealthy – not good for your health
diet – the food that an animal eats
bones – a solid part of the skeleton
vertebrate – an animal with a backbone (spine)
invertebrate - an animal without a backbone (spine)

Working Scientifically Objectives

- identify and group animals with and without skeletons and observe and compare their movement;
- explore ideas about what would happen if humans did not have skeletons;
- compare the diets of different animals (including their pets) and decide ways of grouping them according to what they eat;
- research different food groups and how they keep us healthy and design meals based on what they find out;
- ask relevant questions and using different types of scientific enquiries to answer them;
- record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables;
- report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.

Previous Learning

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

Future Learning

Year 4 – describe the simple functions of the basic parts of the digestive system in humans; identify the different types of teeth in humans and their simple functions; construct and interpret a variety of food chains, identifying producers, predators and prey.
Year 5 – describe the changes as humans develop to old age.

Stretch and Challenge Across the Curriculum

Make a model to show how the muscles work. Design a healthy packed lunch that has each food type. Research other animals that have similar/different skeletons than humans. Research the use of muscles in other animals. Match animals to their skeletons and explain your reasons for this. Explore ideas about what would happen if humans did not have skeletons. Doctor / Nurse / Vet Visitor, Create their own model of the human arm, with biceps and triceps pulling the lower arm up and down accordingly. Create a presentation to show how muscles contract and relax. Identify and group animals with and without skeletons and compare the ways in which they move. Compare the size of straight arms and bent arms. Measure around the top of an arm when it is straight and when it is bent. Explain what you notice. Record and present data using tables and bar charts.

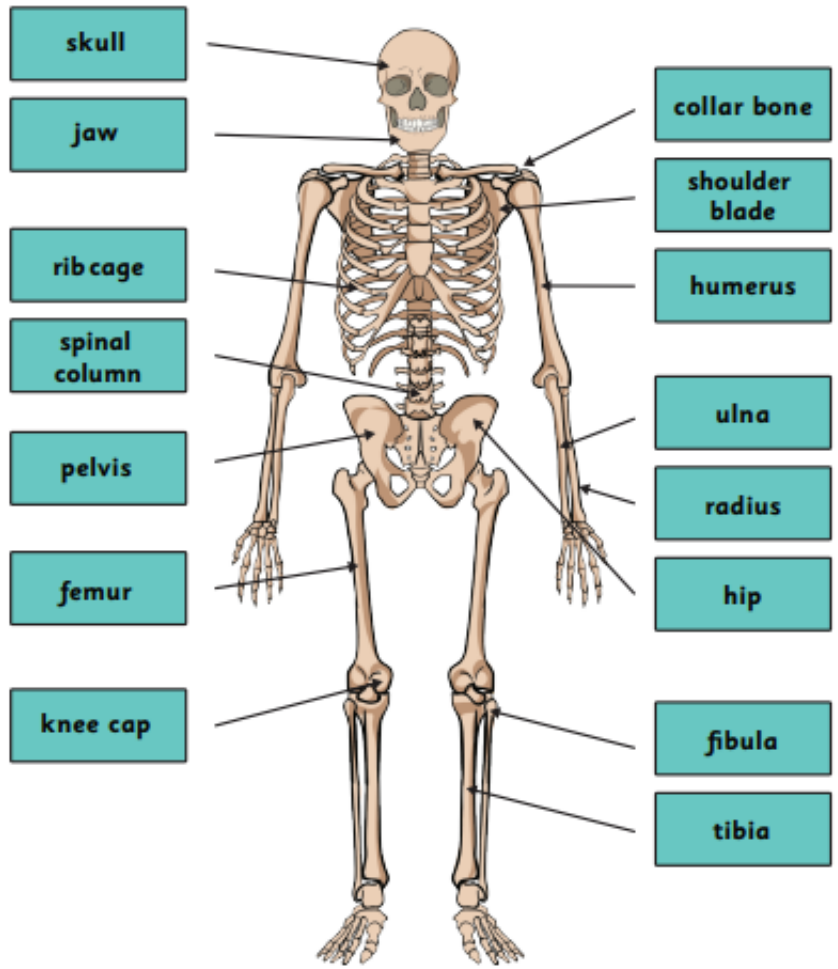
Assessment

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5
Key question: How does our skeleton help us?	**Key question:** Do our bones affect what we can do?	**Key question:** What do our muscles do?	**Key question:** Do all animals have the same skeleton?	**Key question:** What types of nutrition do we need?
Learning objective: I can identify that humans have bones for support, protection and movement.	**Learning objective:** I can set up a simple practical enquiry. I can communicate my results.	**Learning objective:** I can identify that humans have muscles for support, protection and movement.	**Learning objective:** I can identify that some other animals have bones for support, protection and movement.	**Learning objective:** I understand that animals, including humans, need the right type of nutrition.
Success criteria: By the end of this lesson, children will be able to identify the names of some of the bones in the human body and understand that we need bones for support, protection and movement.	**Success criteria:** By the end of this lesson, children will be able to investigate a chosen question by planning out what they will do, gathering data and presenting their results.	**Success criteria:** By the end of this lesson, children will be able to identify how humans use muscles and understand that we need muscles for support, protection and movement.	**Success criteria:** By the end of this lesson, children will be able to identify differences in the skeleton in different animals. They will also be able to group animals based on whether they have a backbone.	**Success criteria:** By the end of this lesson, children will be able to identify the 5 main food types that humans need in order to have a healthy balanced diet.

Animals including Humans Knowledge Organiser

Bones



Other animals

Vertebrates are animals that have a spine or backbone as part of their skeleton. Humans are vertebrates.

Invertebrates are animal that do not have a backbone. A butterfly is an invertebrate.

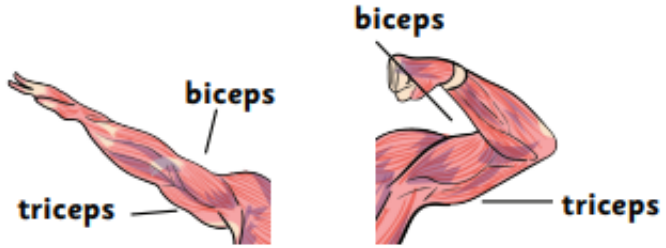
Muscles

To **straighten** our arm, our **biceps relax** and our **triceps contract.** This straightens our arm.

To **bend** our arm, our **biceps contract** and our **triceps relax.** This allows us to bend our arm at the elbow joint.

When we **stretch** our muscles, they become **longer** and **thinner.**

When we **contract** our muscles, they become **shorter.**



Nutrition

Humans need to eat a **healthy balanced diet.**

Nutrition is when we eat food to **give us energy.** Adults and children need lots of energy to help them **keep moving** and keep their **bodies healthy!**

Children also need food to **help them grow.**
The Eatwell **Plate shown** below s a guide to help show us how much of each type of food **we should eat.**

fruit & veg **dairy** **sugar & fats**

carbs & starches **protein**

Key Vocabulary

bone - hard parts of the skeleton

contract - to squeeze together

diet - the food that we eat

exoskeleton - a skeleton on the outside of the body

invertebrate - an animal without a spine/backbone

healthy - things that are good for our bodies

muscle - a bundle of tissue that contracts to allow movement

nutrition - the food we eat that gives us energy

relax - to become less tense

skeleton - a framework of bone to support the body

unhealthy - things that are not good for our bodies

vertebrate - an animal with a spine/backbone

Y3 Animals including Humans Knowledge Organiser Quiz

1. True or false?

	True	False
1. A skeleton is made up **of bones.**	☐	☐
2. All living things **have a skeleton.**	☐	☐
3. Humans need to eat a **healthy balanced diet.**	☐	☐
4. A human is an **invertebrate.**	☐	☐

2. Match up the **word** to **its meaning.**

invertebrate	**A living thing that has a spine.**
vertebrate	**A living thing that does not have a spine.**

3. Label the different **food groups.**

Y3 ROCKS(CHEMISTRY)

Key Question: How can we classify rocks?

Book Hooks:

The Pebble in My Pocket - Meredith Hooper
Pebble: A Story about Belonging – Susan Milord

Overview of Learning

Pupils will explore different kinds of rocks and soils, including those in the local environment. They will classify and group together rocks based on their appearance as well as their physical properties. They will learn how the Earth is made up of different rocks and fossils and begin to explain how some of the different rocks are formed. Children will also look at fossils, what they are and how they are formed in rock.

Knowledge and Understanding Objectives

Pupils should be taught to:

- Compare and group together different kinds of rocks based on their appearance and simple physical properties; describe in simple terms how fossils are formed when things that have lived are trapped within rock; recognise that soils are made from rocks and organic matter.

Key Vocabulary to Explain

rock – a solid material that makes up the surface of the Earth
soil – a black or dark brown material on the upper layer of the Earth where plants grow
fossil – the remains of a prehistoric animal embedded in rock
appearance – what something looks like
physical properties – a characteristic of an object

Stretch and Challenge Across the Curriculum

Research and discuss the different kinds of living things whose fossils are found in sedimentary rock and explore how fossils are formed. Explore rocks in the local area (link to geography). Observe rocks in different buildings and other objects (like gravestones) and investigate how they may change over time. Explore the different types of living things that are found as fossils. Place a selection of 8 rocks in order of hardness. Predict and then test whether a rock can scratch each of the other rocks. Use their **simple results table** to **create a frequency table** and **bar chart**, and finally attempt to place the rocks in order of hardness. Investigate the properties of rocks. Predict and then observe whether 8 different rocks can be scratched with a nail, are porous, or can float in water. Use their results to **create and label a 1-set Venn diagram**. Using hand lenses, explore two different soil samples. Identify differences and similarities, looking for sand, plant parts, water and minibeasts. Examine a soil sample. Mix it with water inside a bottle, then allow it to settle. Use rocks found around the school. How can we create a key to help us identify them? Using secondary resources to find out about the Moh scale children will be able to give each of their rocks a rough score from the scale. Develop your own sorting criteria. Compare soils to find a relationship between two or more sets of data. Use filter paper, funnel and soil. How long does it take the water to run through 3 types of soil.

Working Scientifically Objectives

- make systematic and careful observations of rocks and explore how and why they might have changed over time;
- use a hand lens or microscope to help them to identify and classify rocks;
- raise and answer questions about the way soils are formed, and explore different soils and identify similarities and differences between them and investigate what happens when rocks are rubbed together or what changes occur when they are in water using simple practical enquiries, comparative and fair tests;
- report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.

Previous 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;
- find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.

Future Learning

Year 4 – Study 'States of Matter' and look at a variety of solids, liquids and gases.

Assessment

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Key question: What are rocks?	**Key question:** Are all rocks the same?	**Key question:** How are rocks formed?	**Key question:** Which rocks make up the Earth?	**Key question:** What are soils?	**Key question:** How are fossils formed?
Learning objective: I can compare and group together different kinds of rocks on the basis of their appearance.	**Learning objective:** I can compare and group together different kinds of rocks on the basis of their physical properties.	**Learning objective:** I can explain how some rocks are formed.	**Learning objective:** I can explain how the Earth is made up of different layers of rocks and soils	**Learning objective:** I can investigate different soils.	**Learning objective:** I can describe how fossils are formed when things that have lived are trapped within rock.
Success criteria: By the end of this lesson, children will be able to identify what a rock is and group together rocks based on their appearance.	**Success criteria:** By the end of this lesson, children will be able to plan and carry out an investigation in order to group rocks together based on their physical properties.	**Success criteria:** By the end of this lesson, children will be able to discuss the three different types of rock and begin to explain how they are formed.	**Success criteria:** By the end of this lesson, children will be able to describe the different layers of the Earth.	**Success criteria:** By the end of this lesson, children will be able to identify different types of soils and describe their properties.	**Success criteria:** By the end of this lesson, children will be able to explain what a fossil is and describe how a fossil is formed in rock.

Rocks and Soils

Rocks

If you dig down anywhere on Earth you will find rock. Rocks can be hard, soft, permeable or impermeable, depending on what type of rock it is. Slate, marble, chalk and granite are all different types of rock and all have different uses.

Soils

Top soil which is full of nutrients and contains rotting plants and organisms.

Subsoil which is tightly packed soil, lighter in colour to the top soil as it contains fewer nutrients.

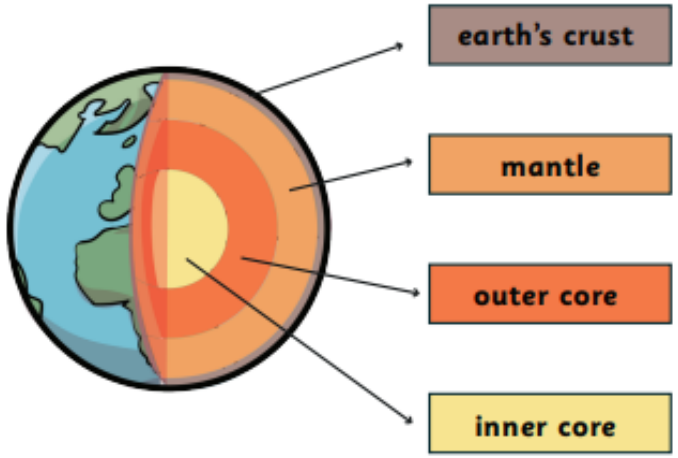
Rocky soil which is rocks that are breaking down in to soil.

Bedrock which is just rock.

Fossils

A fossil is the preserved remains or traces of a dead organism. The process by which a fossil is formed is called fossilisation.

Under our feet



Types of rock

Igneous rock - When a volcano is about to erupt, magma comes to the surface. As it flows down the volcano and across the land, it cools and turns back into a solid. This forms rock.

Sedimentary rock - When a river reaches the sea, pieces of broken rock settle at the bottom of the sea to form a layer of sediment. Over millions of years, more and more layers of sediment settle on top and squash it down until it turns into rock.

Metamorphic rock - Metamorphic rock is formed from other rocks that are changed because of heat or pressure.

Key Vocabulary

crust - the outer layer of the Earth

decay - to rot or decompose

fossil - the preserved remains of a dead organism

geologist - a person who studies rocks

igneous rock - rock formed from cooled magma

impermeable - doesn't allow liquid to pass through

inner core - the very centre of the Earth

mantle - the part of the Earth between the crust and the core

metamorphic rock - rock formed from changes of heat or pressure

microbe - a small living thing

mine - to dig into the Earth for rocks and minerals

permeable - allows liquid to pass through

rock - any naturally occurring solid mineral material

sedimentary rock - rock formed by layers of sediment

soil - made up of pieces of rock, minerals, decaying plant material, microbes and water

Rocks and soils Quiz

1. Name the three different **types of rock.**

_____

2. Which type of rock requires a **volcano to erupt?**

_____

3. Which type of **rock requires water?**

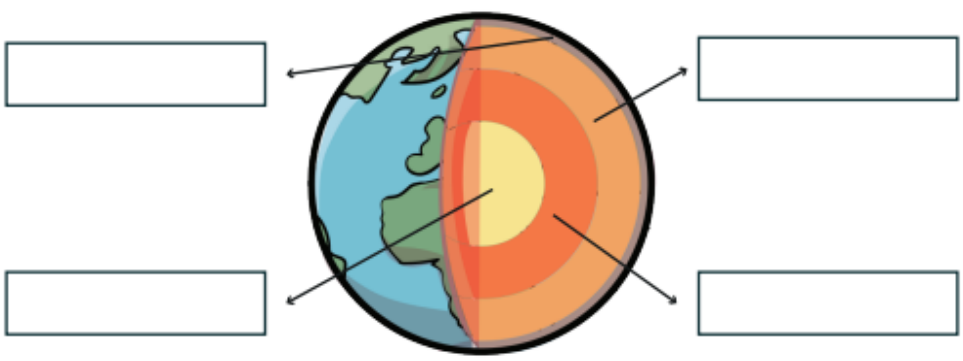
_____

4. A ***fossil*** is _____

5. True or false?

A geologist is a person who studies the planets. _____

6. Label the layers of the **Earth.**



7. Which of these is NOT a **type of soil?**

top soil	sub soil	stony soil
brown soil	bottom soil	rocky soil

Y3 LIGHT (PHYSICS)

Key Question: What is light?

Book Hooks:

The Owl Who was Afraid of the Dark – Jill Tomlinson

Overview of Learning

Pupils will explore what happens when light reflects off a mirror or other reflective surfaces. They will think about why it is important to protect their eyes from bright lights. They will look for, and measure, shadows, and find out how they are formed and what might cause the shadows to change.

Knowledge and Understanding Objectives

Pupils should be taught to:

- recognise that they need light to see things and that dark is the absence of light;
- notice that light is reflected from surfaces;
- recognise that light from the sun can be dangerous and that there are ways to protect their eyes;
- recognise that shadows are formed when the light from a light source is blocked by an opaque object;
- find patterns in the way that the size of shadows change.

Key Vocabulary to Explain

light source - something that emits light
dark - the absence of light
reflect - a surface (or body) that throws back light without absorbing it
shadow - an area where direct light from a light source cannot reach due to obstruction by an object
opaque - opaque materials do not let any light pass through them. They block the light.
translucent - translucent materials let some light through, but scatter the light in all directions so that they cannot see clearly through them
transparent - transparent materials let light pass through them in straight lines so that you can see clearly through them
luminous - giving o light, bright or shining

Stretch and Challenge Across the Curriculum

Answer questions about which objects are light sources, explaining their reasoning, use a range of diagrams to communicate scientific understanding about how we see objects and how shadows form, explain why wearing sunglasses is important to protect your eyes. Compile a quiz based on knowledge gained in the unit.

Working Scientifically Objectives

- Set up simple practical enquiries, comparative and fair tests;
- gather, record, classify and present data in a variety of ways to help in answering questions;
- make systematic and careful observations and where appropriate, take accurate measurements using standard units, using a range of equipment;
- draw conclusions; answer questions and describe the relationship between the height of a light source and the length of a shadow, and use results to make predictions for new values, suggest improvements and raise further questions.

Previous Learning

KS1 - Children do not study light as a separate topic. However, as part of seasonal changes topic, children will have observed and talked about changes in the weather and the seasons and will have talked about the dangers of looking at the Sun directly. **Year 2** - children might have observed the effect of light on plant growth

Future Learning

Animals and humans are studied in each year group.
Year 6 – recognise that light appears to travel in straight lines; use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye; explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes; use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

Assessment

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Key question: What is a light source?	**Key question:** What is reflected light?	**Key question:** Is the Sun dangerous?	**Key question:** What is a shadow?	**Key question:** Does moving the light source above the object make the object's shadow longer?	**Key question:** How do mirrors work?
Learning objective: I can recognise that there needs to be light in order to see things and that darkness is the absence of light.	**Learning objective:** I can notice that light is reflected from surfaces.	**Learning objective:** I can recognise that light from the Sun can be dangerous and that there are ways to protect your eyes and skin from the Sun.	**Learning objective:** I can recognise that shadows are formed when light from a light source is blocked by an opaque object. I know that shadows take on the shape of the opaque object. I can predict where a shadow will form in relation to an opaque object and a light source.	**Learning objective:** I can find patterns in the way that the length of shadows change.	**Learning objective:** I know that light is reflected from surfaces (mirrors).
Success criteria: By the end of this lesson, children will be able to identify natural and man-made light sources; explain what darkness is and sort light sources according to criteria.	**Success criteria:** By the end of this lesson, children will be able to identify reflective materials and understand how light is reflected. They will be able to design a poster to encourage younger children to wear reflective materials at night to keep them safe.	**Success criteria:** By the end of this lesson, children will be able to explain why the Sun can be harmful to our eyes if we look at it directly. They will be able to identify ways in which we can protect ourselves from sun damage.	**Success criteria:** By the end of this lesson, children will be able to predict which materials make the best/worst shadows using the knowledge gained through their own exploration.	**Success criteria:** By the end of this lesson, children will be able to talk about the relationship between the height/ angle of the light source and the length of the shadow. They will be able to use the results from their investigation to explain how they know.	**Success criteria:** By the end of this lesson, children will be able to explain how mirrors reflect light. Through their explorations, they will have an understanding of how light behaves when it is reflected.

Light Knowledge Organiser

Light sources

A light source makes light. The Sun and other stars, fires, torches and lamps all make their own light, so they are examples of sources of light.



Dark

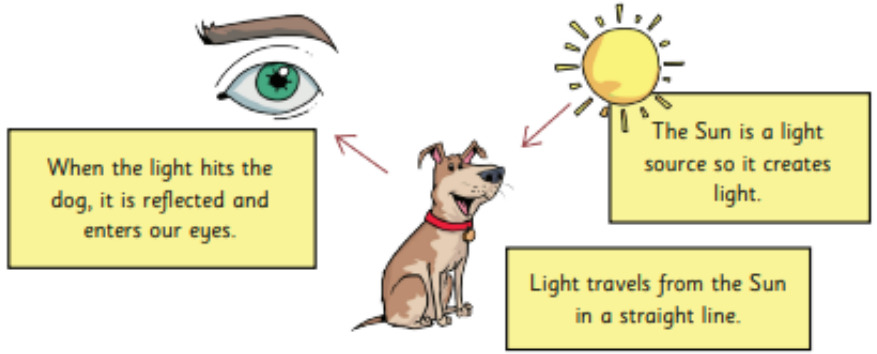
Darkness is what happens when there is an absence of light. When there is no light, it is dark.

Reflective light

We can see things because light is reflected. Some materials reflect light better than others.

Light travels in straight lines. When light from an object is reflected by a surface, it changes direction.

Smooth, shiny surfaces such as mirrors and polished metals reflect light well. Dull and dark surfaces such as dark fabrics do not reflect light well.

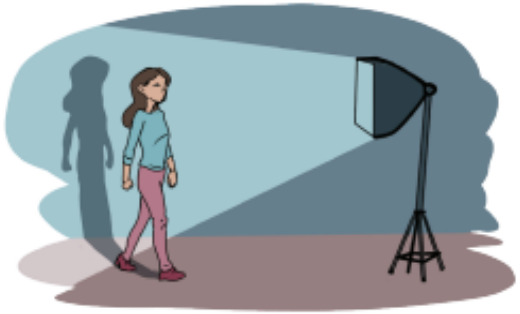


The Sun

The Sun is the biggest light source we use. It is a giant ball of hot, burning gas. It can damage our eyes if we look directly at it. We should protect our eyes from the Sun by wearing sunglasses and a hat.

Shadows

A shadow is made when an object blocks light. A shadow is a dark area or shape caused by a solid object blocking the rays of light from a light source.



Types of objects

Objects are either opaque, translucent or transparent.

Opaque objects let no light pass through.

Translucent objects let some light pass through.

Transparent objects let light pass through.

Key Vocabulary

dark - the absence of light

direction - the way that something is moving

light - a source of energy that allows you to see

light ray - an imaginary line that represents the line of light

light beam - a group of light rays

light source - something that makes light

opaque - cannot be seen through

reflect - bounces off or changes direction

reflective - something that reflects well

refraction - when light changes direction when going through the boundary of a state of matter

see - to perceive with the eyes

shadow - a dark area or shape produced by an object coming between rays of light and a surface

transparent - can be seen through

translucent - can be seen through, but not clearly

Light Knowledge Organiser Quiz

True or False?

	True	False
1. A light source makes light.	☐	☐
2. Dark is the absence of light.	☐	☐
3. A table is a light source.	☐	☐
4. You can see through an opaque object.	☐	☐
5. A window is transparent.	☐	☐
6. A shadow is formed when an object blocks light.	☐	☐
7. Light travels in wavy lines.	☐	☐
8. Mirrors reflect light well.	☐	☐

Quick Quiz

1. Name an opaque object.

_____

_____

2. Explain what a shadow is.

_____

_____

3. Complete the sentence.

When light is reflected from a surface, it changes _____

4. Name two light sources.

_____

_____

5. How can we protect our eyes from the Sun?

_____

_____

Y3 FORCES AND MAGNETS (PHYSICS)

Key Question: How do magnets work?

Book Hooks:

The Iron Man – Ted Hughes

Overview of Learning

Pupils will observe that magnetic forces can act without direct contact, unlike most forces, where direct contact is necessary. They will explore the behaviour and everyday uses of different magnets.

Working Scientifically Objectives

Set up simple, practical enquiries, comparative and fair tests;
Gather, record, classify and present data in a variety of ways to help in answering questions;
Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions;
Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.

Knowledge and Understanding Objectives

Pupils should be taught to:

- compare how things move on different surfaces;
- notice that some forces need contact between two objects, but magnetic forces can act at a distance;
- observe how magnets attract or repel each other and attract some materials and not others;
- compare and group together a variety of everyday materials based on whether they are attracted to a magnet and identify some magnetic materials; describe magnets as having two poles ;
- predict whether two magnets will attract or repel each other, depending on which poles are facing.

Previous Learning

Year 2 - explore different forces 'Uses of everyday materials' whilst investigating how some materials can be changed by bending, squashing, twisting and stretching.

Future Learning

Animals and humans are studied in each year group.
Year 5 – 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. Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.

Key Vocabulary to Explain

Force – a push, pull, twist or turn caused when two objects interact with each other
magnet – an object or device that attracts iron or another magnetic material
contact – touching
non-contact – not touching
attract – pull towards
repel – push away
magnetic– attracted to a magnet
non-magnetic – not attracted to a magnet
iron – a metal that can be made into a magnet

Stretch and Challenge Across the Curriculum

Design a poster to explain the difference between a push and a pull or contact and non-contact force, create a glossary of the scientific vocabulary they have learnt throughout the unit, use force meters to measure the attracting force of the magnets, research how magnets are used in everyday life and write an explanation text to explain why magnets are important. Investigate the best surface to place on a floor to prevent people from slipping. Predict and then measure the force required to make a shoe containing a weight slide across a range of surfaces. Design a classroom organisation tool using a magnet, e.g., nameplates, attendance tracker etc. Present surface friction results in a **bar chart** and attempt to answer a scientific question. Transfer results to a **2-dimensional Carroll diagram**, showing both which objects were magnetic, and which were made of metal. Use results to complete a **Venn diagram containing a single set.** Place results in a **Venn diagram containing 2 overlapping sets.** Transfer results to a **bar chart**.

Assessment

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Key question: What is a force?	**Key question:** Do objects move the same on different surfaces?	**Key question:** How do magnetic forces work?	**Key question:** Which materials are magnetic?	**Key question:** Do magnets attract each other?	**Key question:** Are all magnets the same strength?
Learning objective: I can compare how different things move.	**Learning objective:** I can plan and conduct a fair test to compare how objects move on different surfaces.	**Learning objective:** I can explore how magnetic forces act at a distance.	**Learning objective:** I can compare and group various everyday materials based on whether they are attracted to a magnet.	**Learning objective:** I can predict whether two magnets will attract or repel each other, depending on which poles are facing.	**Learning objective:** I can record my findings using simple scientific vocabulary. I can use my results to draw simple conclusions.
Success criteria: By the end of this lesson, children will be able to describe pushes and pulls as a type of force and give examples. They will be able to explain how different objects move using these forces.	**Success criteria:** By the end of this lesson, children will be able to discuss how the object moved on different surfaces. They will be able to explain how they planned a fair test.	**Success criteria:** By the end of this lesson, children will be able to explain that there are forces that require contact and forces that do not. They will be able to describe magnetic force as non-contact and that it acts at a distance.	**Success criteria:** By the end of this lesson, children will be able to identify a range of magnetic and non-magnetic materials that they have identified from their explorations.	**Success criteria:** By the end of this lesson, children will be able to describe magnets as having two poles - North and South. They will be able to explain how opposite poles attract and the same poles repel.	**Success criteria:** By the end of this lesson, children will be able to describe how not all magnets have the same strength. They will be able to use the results from their investigation to explain how they know.

Forces and Magnets Knowledge Organiser

Forces

A force is a push or pull that acts upon an object. We can't see forces, but they are an important part of our everyday lives.

We push and pull objects to do many different things. When we push or pull objects, we can move the object, change the object's shape, or make the object change direction.

Magnets

south **magnetic pole**

north **magnetic pole**

Magnets are usually made from iron. They can attract and repel other objects with their magnetic forces. Magnetic forces act at a distance meaning that a magnet does not need to be in contact with another object for the magnetic forces to act.

Magnets can be lots of different shapes, sizes and colours, but they will always have a north and south magnetic pole.

Examples of **pushes** and **pulls**

pushes	pulls
	

Examples of **magnetic objects**:

iron nails

steel spoon

steel paperclip

Magnets and their poles

Same poles repel.

If you try to put two magnets together with the same poles pointing towards one another, the magnets will push away from each other. We say they repel each other.

Different poles attract.

If you put two magnets together with different poles pointing towards one another, the magnets will pull towards each other. We say they attract each other.

Fantastic force facts!

- All forces are really just a push or a pull.
- Magnetism is a type of force. A magnet might pull an object towards it or push it away.
- Not all metals are magnetic!
- Sir Issac Newton was one of the first scientists to study forces.

Key vocabulary

attract - to pull towards

contact - when objects touch

different - not the same

distance - the length between two objects

force - a push or pull that acts upon an object that can cause it to move, change shape or change direction

friction - the force that acts upon one surface when it moves against another

magnet - a piece of iron that attracts and repels

magnetic force - when a magnet pulls objects towards it or pushes objects away

magnetic pole - each end of the magnet where the force is the strongest

pull - to move something towards

push - to move something away

repel - to push away

same - identical, not different

Forces and Magnets
Knowledge Organiser Quiz

True or False?

	True	False
1. All magnets are bar-shaped.	☐	☐
2. A force is a push or pull that is acting upon an object.	☐	☐
3. You can see forces.	☐	☐
4. Magnets have two poles.	☐	☐
5. Opposite poles on magnets attract each other.	☐	☐
6. All metals are magnetic.	☐	☐
7. Magnetism is a force that acts at a distance.	☐	☐
8. All forces act at a distance.	☐	☐

Quick Quiz

1. Name two types of forces.

_____

2. Explain what attract and repel mean.

_____

3. What is a magnet?

_____

4. What is a magnetic pole?

_____

5. Complete the sentence.

Opposite poles _____ and the same poles _____.

Year 4

Y4 LIVING THINGS AND THEIR HABITATS (BIOLOGY)

Key Question: Which living things can be found in the local area?

Book Hooks:

Journey to the River Sea – Eva Ibbotson
The Morning I Met a Whale – Michael Foreman

Overview of Learning

Pupils will use the local environment to raise and answer questions that help them to identify and study plants and animals in their habitat and observe changes. Pupils will begin to put vertebrate animals into groups such as fish, amphibians, reptiles, birds, and mammals; and invertebrates into snails and slugs, worms, spiders, and insects. They will learn to identify unknown living things using a classification key. Pupils will explore examples of human impact (both positive and negative) on environments.

Knowledge and Understanding Objectives

Pupils should be taught to:

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

Key Vocabulary to Explain

environment – the conditions (both living and non-living) that surround an organism
classify – to arrange a group of people or things in classes or categories according to shared qualities or characteristics
vertebrate – an animal that has a backbone
invertebrate – an animal without a backbone
exoskeleton – a rigid external covering for the body in some invertebrates
key – a questioning device that allows the progressive narrowing down of the classification of an unknown living thing based on observable or testable features
adaptation – the way in which an organism is particularly suited to its environment
pollution – the introduction into the environment of a substance which has harmful effects

Assessment

Working Scientifically Objectives

- ask relevant questions and using different types of scientific enquiries to answer them;
- compare the effect of different factors on plant growth - the amount of light, the amount of fertiliser;
- make systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers;
- record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables;
- report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.

Previous Learning

- identify and describe the function of various parts of a plant. They will have explored the part flowers play in the life cycle including pollination, seed fertilisation and seed dispersal.

Future Learning

Plants are studied in each year group.
Year 5 – describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird describe the life process of reproduction in some plants and animals.
Year 6 – describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals give reasons for classifying plants and animals based on specific characteristics.

Stretch and Challenge Across the Curriculum

Use and make simple guides or keys to explore and identify local plants and animals; make a guide to local living things. Design their own minibeast. It could have features from a minibeast that is already alive, or it could be a combination of different minibeast. Check a classification key to see if it works. Draw a persuasive poster to encourage people not to litter in the local area. Investigate the local area and draw pictures of different organisms. Create their own classification key by repeatedly asking dichotomous questions (with exactly two answers), splitting the group up until each group only has one member. Research and explain how environmental dangers may impact on animals, e.g., endangered species. Use criteria to sort living things in a **Carroll diagram**. Show the characteristics of living things using a **table and a key**.

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Key question: What are the seven life processes?	**Key question:** How can we sort and group animals?	**Key question:** What are vertebrate animals?	**Key question:** Which living things can be found in the local area?	**Key question:** What is a classification key?	**Key question:** How is our environment changing?
Learning objective: I can develop descriptions using relevant scientific language and vocabulary.	**Learning objective:** I can recognise that living things can be grouped in a variety of ways.	**Learning objective:** I can recognise that living things can be grouped in a variety of ways.	**Learning objective:** I can explore and name a variety of living things in my local environment.	**Learning objective:** I can explore and use classification keys to help group, identify and name a variety of living things in my local environment.	**Learning objective:** I can recognise that environments can change and that this can sometimes pose dangers to living things.
Success criteria: By the end of this lesson, children will be able to name each of the seven life processes using the acronym MRS GREN. They will be able to explain how animals and plants complete each of the life processes and be able to distinguish living from non-living objects using this knowledge.	**Success criteria:** By the end of this lesson, children will be able to name the five main animal groups. They will be able to look at the characteristics of an animal and sort into the correct group. They will be able to use the terms herbivore, omnivore and carnivore correctly and sort animals according to their diet. They will be able to think of their own criteria to sort and group animals.	**Success criteria:** By the end of this lesson, children will be able to sort groups of animals into vertebrates and invertebrates. They will use the knowledge gained in the lesson to produce a leaflet to explain the difference between vertebrate and invertebrate animals.	**Success criteria:** By the end of this lesson, children have explored their school grounds/local area and used identification keys to help name a variety of living things, including minibeasts. As a class, the children will create an information booklet about the living things that live in the school environment.	**Success criteria:** By the end of this lesson, children will be able to use a classification key to identify living things. They will use this knowledge to construct their own key to identify living things found in their local area.	**Success criteria:** By the end of this lesson, children will understand the effect that human activity has on the environment. They will be able to produce a balanced argument in response to the question – Should litter be banned?

Living Things & their Habitats

Life Processes

There are **seven things** that all living things do, we call these **life processes**. All **animals**, including **humans,** do these and **plants** do too! We can remember them with the help of **Mrs Gren!**

Movement

Respiration

Sensitivity

Growth

Reproduction

Excretion

Nutrition

Grouping Animals

We can group animals into **five different groups** based on their characteristics.

Fish

Mammal

Reptile

Amphibian

Bird

How else can we group animals?

We can also group animals based on the **types of food** they eat.

Omnivore

Carnivore

Herbivore

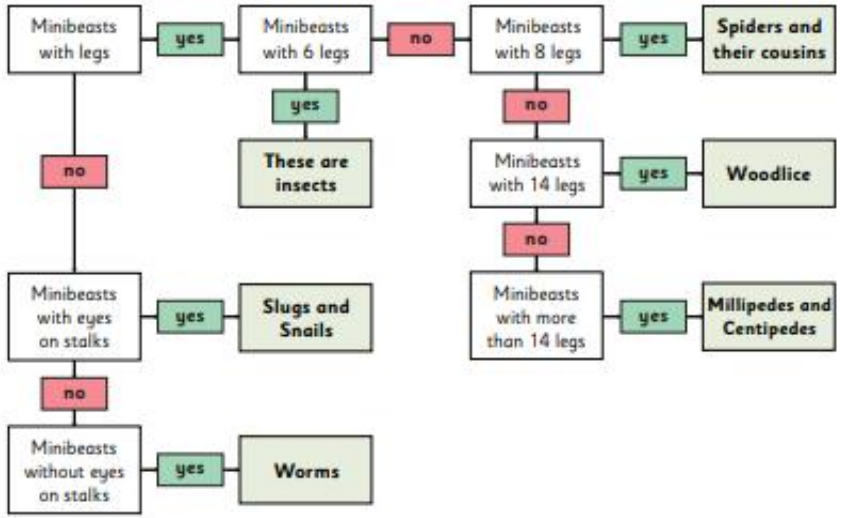
We can also **group animals** based on whether they have a **backbone** (spine) or not.

Vertebrates	Invertebrates
dog	slug
cat	snail
human	butterfly
lion	spider
bird	crab
shark	bee
tiger	jellyfish

Classification Keys

Classification keys usually have statements or questions that describe some of the **features** or **characteristics**. You have to answer either **yes** or **no**. Your answer will then take you to another **question** or **statement** OR the **type of living thing**.

This one looks at **amount of legs** the living thing has and the **placement of their eyes**.



Use the **classification key** to identify these minibeasts.

Key Vocabulary

amphibians - an animal that is born in the water but develops lungs and lives on land later in its life

birds - a type of animal that has wings and is born from a hard-shelled egg

carnivore - a living things that just eats meat

characteristic - a feature or quality

classification - to categorise or group something

excretion - to dispose of waste

fish - a type of animal that lives in water and has scales, gills and fins

group - sorting things based on their similarities

growth - to get bigger

herbivore - a living thing that just eats plants

invertebrate - an animal that does not have a backbone

mammals - a type of animal that has hair on its body and usually drinks milk from its mother as a baby

movement - to change position

nutrition - the food we eat

omnivore - a living thing that eats both plants and meat

reproduce - to create more of the same species

reptiles - a type of animal that is cold-blooded and has scaly skin

respiration - taking in gas and giving out another (breathing in humans)

sensitivity - using your senses (see, smell, hear, touch, taste)

vertebrate - an animal with a backbone

Y4 Living Things and Their Habitats
End of Topic Test

1. Fill in the missing **life processes**.

M
Respiration
Sensitivity
Growth
R
Excretion
N

2. Define these **life processes**.

Respiration

Excretion

3. Sort these animals into the **different groups**.

keywords

penguin **shark** **human** **elephant** **clownfish** **lizard** **toad** **frog** **snake** **eagle**

Mammal	Reptile	Fish	Amphibian	Bird

4. Give another **example** of how we could **group** these animals.

_____

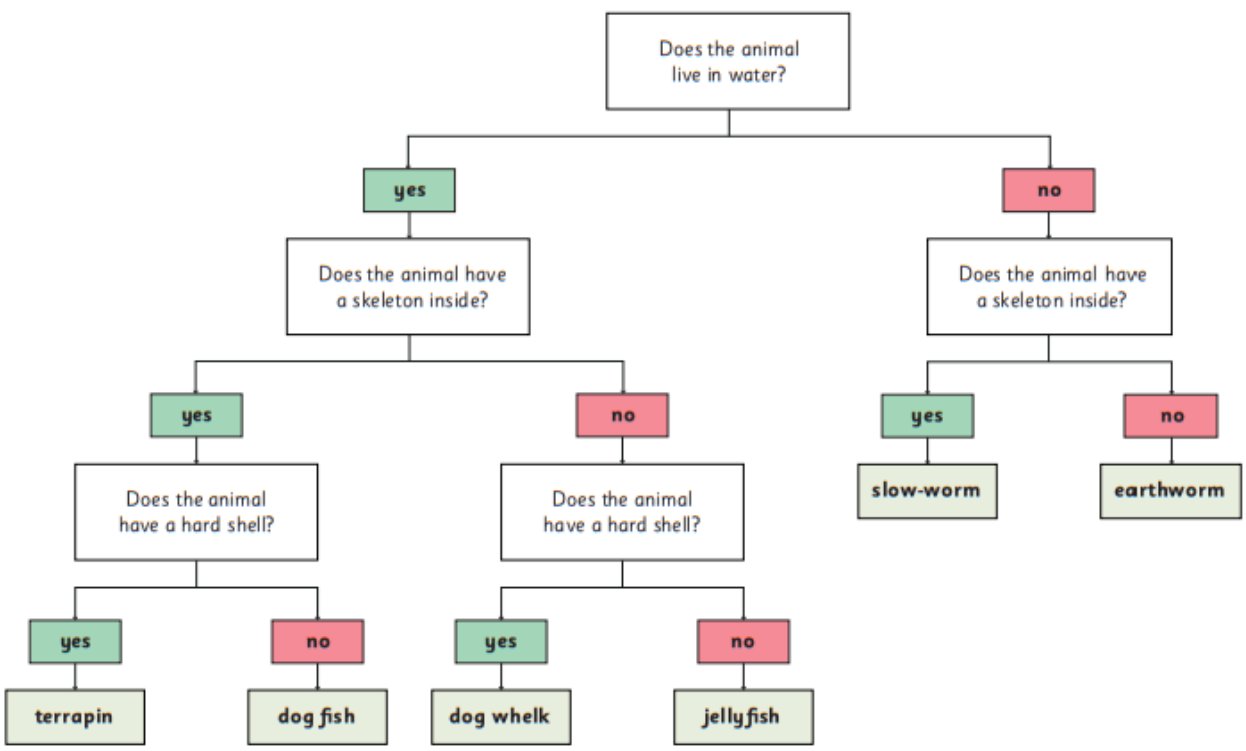
_____

5. Some children find four **minibeasts**. They make a table about their **observations**. Complete the table below by adding the **names** of these four mini-beasts.

Name	Legs	Wings	Antennae
	6	4	2
	6	2	2
	6	0	2
	8	0	0



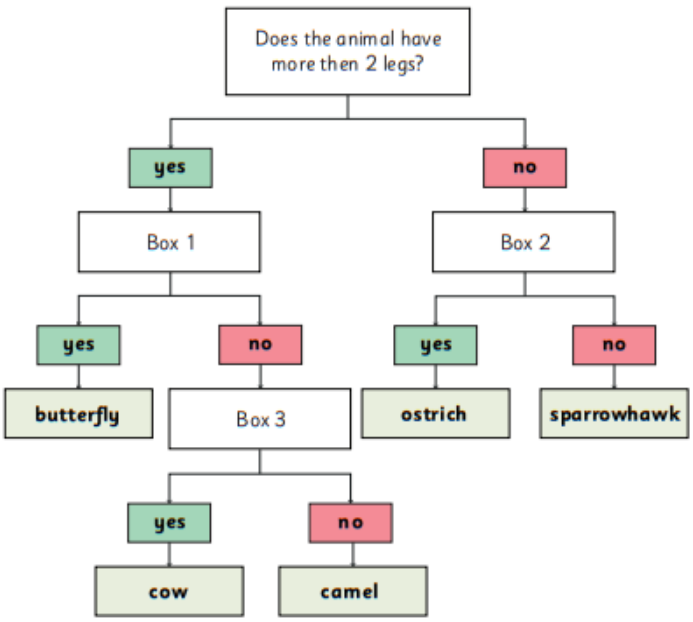

6. The **key** below can be used to **identify** some animals.



Use **the information** in the key to help you **circle** the animals in the box below that **do not have a skeleton** inside their bodies. Circle all the **correct answers**.

terrapin	**dogfish**	**dog whelk**
jellyfish	**slow-worm**	**earthworm**

7. Mandy and Halim **sort** the animals using the **key** below.



Question	The question goes in box...
Does it have a long neck?	1 3
Does it have horns?	1 2
Does it have antennae?	2 3

8. It is important for scientists to **classify** animals into groups. Tick **ONE box** to show the best reason for **classifying** animals.

- ☐ to compare the many types of animal
- ☐ to find out which animals live in trees
- ☐ to find out which animals eat them
- ☐ to help find animals in the wild

9. Give **two examples** of how people **littering** can affect living things and their **habitats**.

1. _____

2. _____

10. What is **deforestation**?

_____

_____

Y4 ANIMALS INCLUDING HUMANS (BIOLOGY)

Key Question: What happens to the food that we eat?

Book Hooks:

The Little Mole Who Knew It Was None of His Business - Werner Holzwarth

Overview of Learning

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

Knowledge and Understanding Objectives

Pupils should be taught to:

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

Key Vocabulary to Explain

Canines – ripping teeth
Carnivore – animals that only eat other animals
Digestion – the process of breaking down food into simple chemicals for the body to absorb
Herbivore – animals that only eat plants
Incisor – cutting teeth
Large intestines – where water is absorbed into the blood
Molars – grinding teeth
Oesophagus – food and water pipe
Omnivore – animals that eat both plants and animals
Peristalsis – muscular action to move food along the digestive tubes **Predator –** an animal that hunts, kills and eats other animals for food **Prey –** a term used to describe organisms that predators kill for food **Producer –** a plant in a food chain
Saliva – a lubricating digestive juice produced in the mouth
Small intestines – where food is broken down and nutrients are absorbed into the blood
Stomach – a rounded vessel in the body where acid and digestive juices break down food

Working Scientifically Objectives

- set up simple practical enquiries, comparative and fair tests;
- make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers;
- gather, record, classify and present data in a variety of ways to help answer questions;
- record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables;
- report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions;
- use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.

Previous 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;
- identify that humans and some other animals have skeletons and muscles for support, protection and movement.

Future Learning

Year 5 – describe the changes as humans develop to old age.
Year 6 – identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood; recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function; describe the ways in which nutrients and water are transported within animals, including humans.

Stretch and Challenge Across the Curriculum

Identify the parts of the digestive system and explain their functions. How long is your digestive tract? How could you find out? What could you do? Combine a range of everyday objects to create a functioning digestive system model. Record findings using simple scientific language, drawings, labelled diagrams and keys. Complete an explanation text with accompanying diagram by either cutting and pasting text or writing their own explanation. Create a presentation to show how our food is digested.

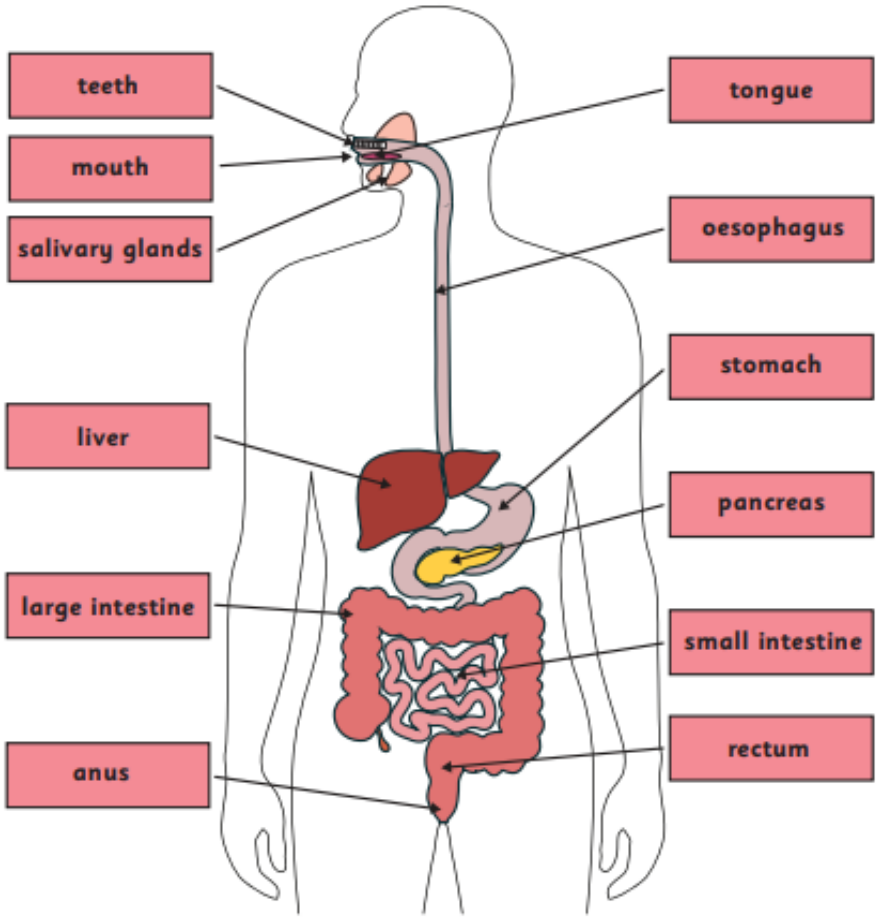
Assessment

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5
Key question: What is the digestive system?	**Key question:** Why are teeth different shapes?	**Key question:** Which drink causes the most tooth decay?	**Key question:** What is a food chain?	**Key question:** How do I play the food chain game?
Learning objective: I can name the basic parts of the digestive system and describe their functions.	**Learning objective:** I can identify the different teeth and describe their functions.	**Learning objective:** I can plan and carry out an investigation. I can communicate my results.	**Learning objective:** I can construct and interpret a variety of food chains. I understand what producers, predators and prey are.	**Learning objective:** I can construct and interpret a variety of food chains. I understand what producers, predators and prey are
Success criteria: By the end of this lesson, children will be able to name twelve main parts of the digestive system and describe their basic functions. They will be able to label a diagram and use scientific vocabulary for description.	**Success criteria:** By the end of this lesson, children will be able to name different teeth and relate the shape of the teeth to the function.	**Success criteria:** By the end of this lesson, children will be able to plan and conduct a fair test investigation to answer the question; which drink causes the most tooth decay? They will make accurate observations and use this information to communicate their results in the form of a text, letter or email message.	**Success criteria:** By the end of this lesson, children will be able to construct and interpret a variety of food chains. They will be able to use the terms herbivore, carnivore and omnivore accurately and identify animals in each of these groups. They will construct food chains and be able to identify the producer, prey and predator in each chain.	**Success criteria:** By the end of this lesson, children will be able to use their knowledge of food chains to correctly construct food chains. After playing the game, children will be able to identify the producer and prey or predator in each food chain.

Teeth and Digestion Knowledge Organiser

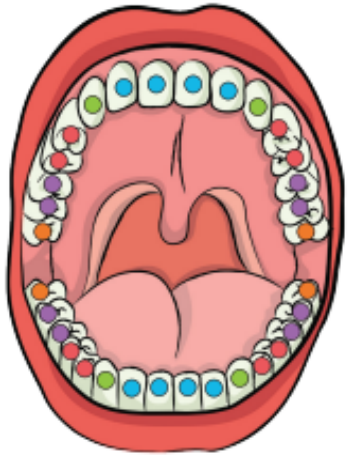
The Digestive System



Digestive Organs and their functions

Organ	Function
mouth	where food enters the digestive system
teeth	tear, rip and chew food
salivary glands	produce saliva
tongue	moves the food into a bolus and pushes it to the oesophagus
oesophagus	a muscular tube which uses contractions to move the bolus from mouth to stomach
stomach	mix with acid and enzymes to turn food into a paste
liver	produces bile to break down fat
pancreas	produces enzymes which break down fats, proteins and carbohydrates
small intestine	absorbs nutrients from the food
large intestine	helps absorb water from the food
rectum	holds the stool until you go to the toilet
anus	where the stool is released

Teeth



Key

- incisors
- canines
- premolars
- molars
- wisdom

Fascinating Facts!

- You have two sets of teeth in your lifetime.
- Adults have 32 teeth whilst children only have 20.
- Our stomach can stretch. An adult's stomach can hold approximately 1.5 litres of food and drink.
- Our oesophagus is approximately 25cm long.
- It takes 7 seconds for food to travel to the stomach once you have swallowed it.
- Scientists believe we have wisdom teeth because our ancestors used to eat a lot of tougher food, such as leaves and nuts, which needed grinding more.

Teeth and their functions

Incisors - We have eight incisors: four on the top jaw and four on the bottom. They are flat and are sometimes described as spade shape. These are the teeth we usually use first when eating. They are used for biting and cutting food.

Canines - We have four canines: two on the top jaw and two on the bottom. Our canines are pointy and sometimes referred to as 'fangs'. We use our canines to tear and rip our food.

Pre-molars - We have eight premolars: four on the top jaw and four on the bottom. They are next to our canines. Our premolars are small and have a flat top. They hold and crush our food.

Molars - We have eight molars: four on the top jaw and four on the bottom. The molars towards the back of our mouths. They are our largest teeth and have a flat top. They are used to grind out food before we swallow it.

Wisdom - When we get older, most of us will grow our wisdom teeth. We have four wisdom teeth. Our wisdom teeth are just an extra molar, so they help with grinding our food. We don't necessarily need our wisdom teeth nowadays, and many people have them removed as our mouths aren't big enough to house them!

Y4 Animals including Humans
End of topic test

1. Explain what these words mean: /3

predator

prey

producer

2. **Create** a **food chain** using these **animals**. Draw the food chain in the box below. Make sure to include the arrows. /5

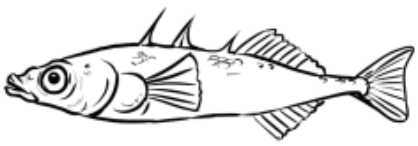
shark, seaweed, small fish, seal

Y4 Animals including Humans
End of topic test

3. The pictures below show some of the things Tom sees in a pond. /1


water beetle


pondweed


stickleback fish

The stickleback fish is a **predator**. Explain why.

_____

_____

4. Tick **ONE** box to show which life process a food chain shows. /1

- ☐ **movement**
- ☐ **nutrition**
- ☐ **growth**
- ☐ **reproduction**

5. **Match** the type of tooth with its function. /5

incisors	**tearing and ripping food**
canines	**holding and crushing food**
premolars	**does not have a function**
molars	**biting and cutting food**
wisdom	**grinding food**

Y4 Animals including Humans
End of topic test

6. Why does brushing teeth help to reduce tooth decay? /1

_____

_____

7. Write **two** other ways we can keep our teeth healthy. /2

1. Brush our teeth twice a day.

2. _____

3. _____

8. Josh is finding out about the digestive system.
Tick **ONE** box to show why we need a digestive system. /1

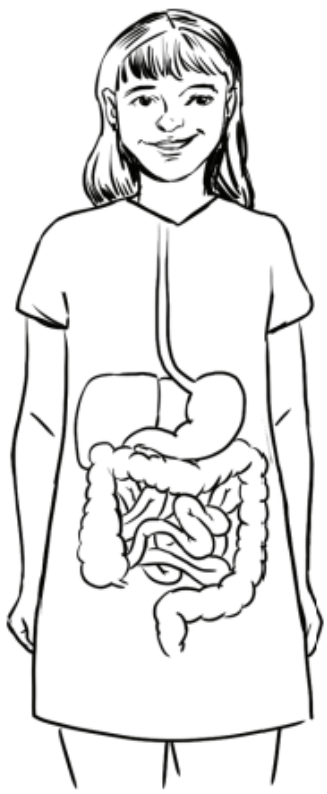
- ☐ **To control how the body moves.**
- ☐ **To break down food for the body to absorb.**
- ☐ **To give support to the body.**
- ☐ **To transport blood around the body.**

9. Josh has some cards labelled with parts of the digestive system.
Write **1** to **5** to show the correct path through the parts of the digestive system. The first one has been done for you. /4

[1] **mouth**	☐ **large intestine**	☐ **oesophagus**
☐ **small intestine**	☐ **stomach**	

Y4 Animals including Humans
End of topic test

10. The girl below is wearing an apron to show parts of the digestive system. Draw an **X** to show the part that is the **stomach**. /1



TOTAL MARKS /24

Y4 STATES OF MATTER (CHEMISTRY)

Key Question: Can materials change state?

Book Hooks:

The Story of Frog Belly Rat Bone - Timothy Basil Ering

Overview of Learning

Pupils will explore a variety of everyday materials and develop simple descriptions of the states of matter. They will observe water as a solid, a liquid and a gas and will note the changes to water when it is heated or cooled.

Knowledge and Understanding Objectives

Pupils should be taught to:

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

Key Vocabulary to Explain

change - to make different
collection - when water flows back into rivers, streams and lakes and gets carried back to sea
condensation - when water vapour cools and turns back into water
evaporation - when water is heated and turns into water vapour
freeze - when something is put at a very low temperature
gas - a state of matter that has no defined shape or volume
heat - when something is put at a hot temperature
liquid - a state of matter that flows freely but keeps the same volume
precipitation - when water falls from the clouds in the sky
property - a characteristic
solid - a state of matter that is firm and stable
temperature - how hot or cold something is
thermometer - an instrument used for measuring temperature

Assessment

Working Scientifically Objectives

- Set up simple practical enquiries, comparative and fair tests;
- make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers;
- gather, record, classify and present data in a variety of ways to help answer questions;
- record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables;
- report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.

Previous Learning

Compare and group together different kinds of rocks based on their appearance and simple physical properties; describe in simple terms how fossils are formed when things that have lived are trapped within rock ; recognise that soils are made from rocks and organic matter.

Future Learning

Year 5 – compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets; know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution ? use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating; give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic; demonstrate that dissolving, mixing and changes of state are reversible changes; explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

Stretch and Challenge Across the Curriculum

Explore the effect of temperature on substances such as ice, wax, chocolate, butter, cream by using thermometers or data-logging temperature probes. How effective are 4 different materials at insulating a cold drink and slowing its increase in temperature? Use **thermometers / dataloggers** to measure the temperature of each cup every 15 minutes over the course of 2 hours. Record their information in **a table** and then **create a line graph showing the temperature of all 4 cups over a 2-hour period.** Make their own solar still to recover water. Find out at which temperature each material would begin to melt. Record results in a **table and a bar graph.** Sort a range of materials in different states. Explain to each other the decisions that they have made. Record choices in a **Venn diagram (three circles).**

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6	Lesson 7
Key Question: What are solids, liquids and gases?	**Key Question:** Do all liquids behave the same?	**Key Question:** What is a thermometer used for?	**Key Question:** How do materials change state?	**Key Question:** What is the water cycle?	**Key Question:** Do all liquids evaporate?	**Key Question:** Does temperature affect the rate of evaporation?
Learning objective: I can identify solids, liquids and gases.	**Learning objective:** I can make careful observations. I can communicate my results.	**Learning objective:** I can take accurate measurements using thermometers.	**Learning objective:** I can observe that some materials change state when they are heated or cooled.	**Learning objective:** I can identify the part played by evaporation and condensation in the water cycle.	**Learning objective:** I can plan and carry out a fair test.	**Learning objective:** I can associate the rate of evaporation with temperature.
Success criteria: By the end of this lesson, children will be able to identify and group solids, liquids and gases. They will be able to describe the characteristics of each state of matter including how the particles are organised.	**Success criteria:** By the end of this lesson, children will be able to plan an investigation to test the viscosity and taste of different ketchups. They will be able to communicate their results in the form of a text, letter or email.	**Success criteria:** By the end of this lesson, children will be able to take accurate measurements using a thermometer. They will be able to use their knowledge to make sensible predictions about temperature.	**Success criteria:** By the end of this lesson, children will be able to explain that heating and cooling can change the state of materials. After conducting an investigation on the melting point of chocolate, children will be able to use their results to draw conclusions and write a report.	**Success criteria:** By the end of this lesson, children will be able to explain the water cycle and identify the part played by evaporation and condensation in the cycle. They will produce a comic strip to explain the journey of a water droplet in the cycle, using scientific vocabulary to describe each process.	**Success criteria:** By the end of this lesson, children will be able to identify the key variables when planning a fair test and state which variable will change and which variables will be controlled/kept the same. The children will be able to draw conclusions and communicate their results.	**Success criteria:** By the end of this lesson, children will be able to explain the relationship between temperature and the rate of evaporation. They will be able to apply their science knowledge to suggest conditions that will accelerate or decelerate the rate of evaporation.

States of Matter Knowledge Organiser

All materials are one of the three states of matter.

Gas

- Gases are **often invisible**.
- Gases do not keep their shape or always take up the same amount of space. They **spread out** and change their shape and volume to fill up whatever container they are in.
- Gases can be **squashed**.

Liquid

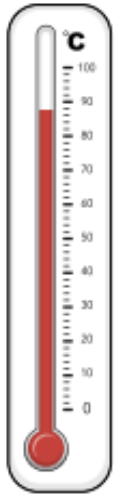
- Liquids can flow or be **poured** easily. They are not easy to hold.
- Liquids **change their shape** depending on the container they are in.
- Even when liquids change their shape, they always take up the **same amount of space**. Their volume stays the same.

Solid

- Solids stay in one place and you can hold them in your hand.
- Solids **keep their shape**. They **do not flow** like liquids.
- Solids always take up the **same amount** of space. They **do not spread** out like gases.
- Solids can be **cut** or **shaped**.

Materials can **change** from one state of matter to another when **heated** or **cooled**.

How to measure temperature using a thermometer.



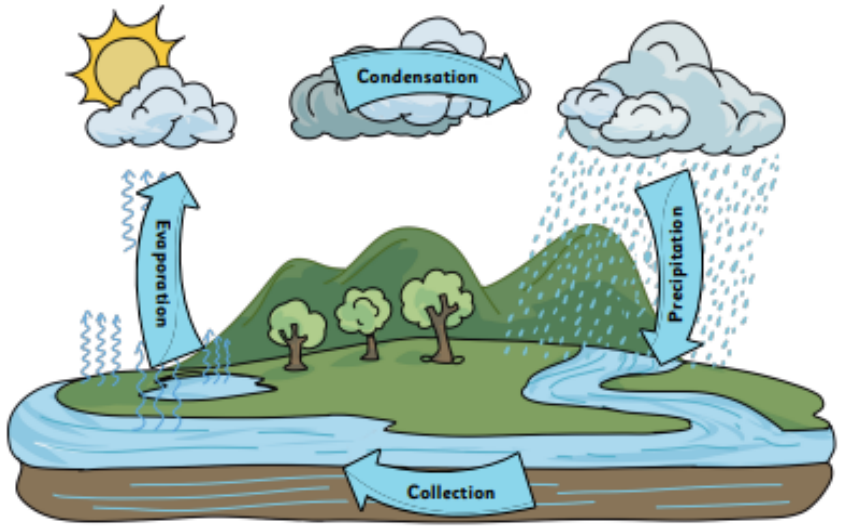
1) Place the thermometer in the liquid.

2) Wait for the coloured centre to stop moving.

3) Read the scale precisely to find the temperature. Ask an adult for help if you are struggling.

Remember: We usually measure temperature in degrees Celsius which can be shortened to °C.

The Water Cycle



Key Vocabulary

change - to make different

collection - when water flows back into rivers, streams and lakes and gets carried back to sea

condensation - when water vapour cools and turns back into water

evaporation - when water is heated and turns into water vapour

freeze - when something is put at a very low temperature

gas - a state of matter that has no defined shape or volume

heat - when something is put at a hot temperature

liquid - a state of matter that flows freely but keeps the same volume

precipitation - when water falls from the clouds in the sky

property - a characteristic

solid - a state of matter that is firm and stable

temperature - how hot or cold something is

thermometer - an instrument used for measuring temperature

Y4 End of Topic States of Matter Test

1. Describe the properties of these states of matter. /3

Solid

Liquid

Gas

2. Give an example of a solid, liquid and gas. /3

Solid - _____

Liquid - _____

Gas - _____

3. How would I change a solid to a liquid? /1

Y4 End of Topic States of Matter Test

4. How would I change a liquid to a gas? /1

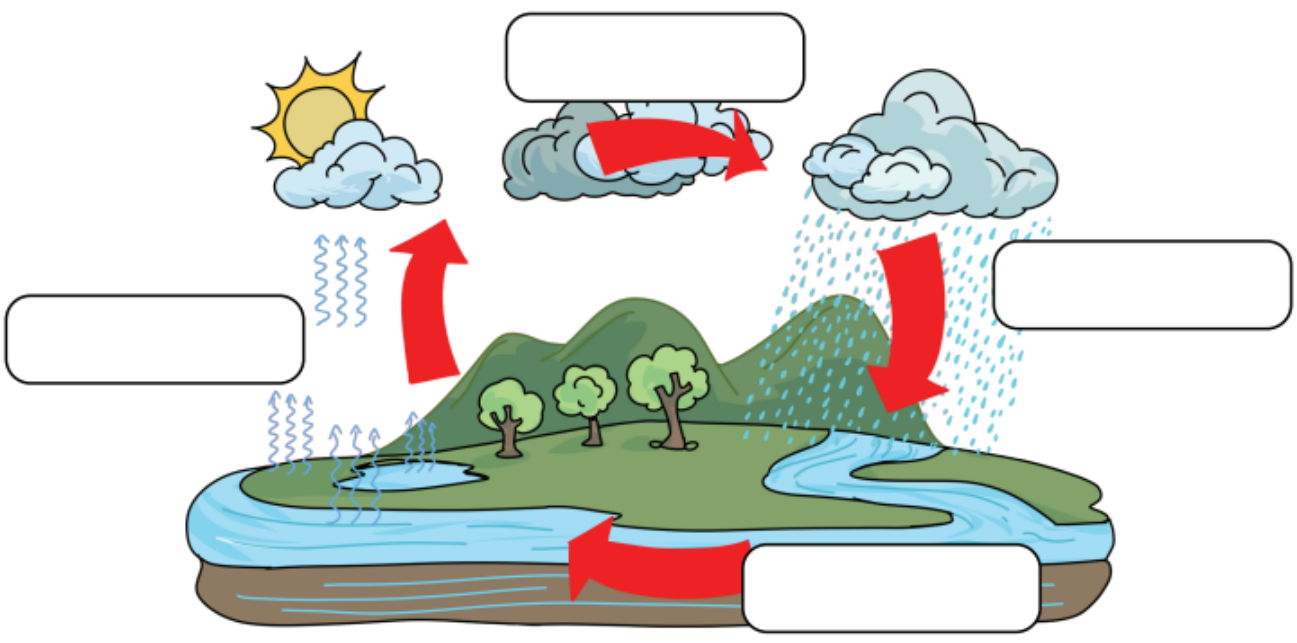
5. What unit of measurement do we measure temperature in? /1

6. What is the freezing point of water? /1

7. What is the boiling point of water? /1

8. If we want to evaporate water quicker, what do we need to do? /1

9. Fill in the boxes to show the parts of the water cycle. /4



Y4 End of Topic States of Matter Test

10. Draw lines to match the word with the correct definition. /4

Collection (Run Off)	When heat from the sun causes water in the sea, lakes and rivers to turn into vapour.
Condensation	When water flows into lakes and rivers, and gets carried back to sea.
Evaporation	When water vapour cools and turns back into liquid, forming clouds in the sky.
Precipitation	When water falls from clouds in the sky.

Y4 SOUND (PHYSICS)

Key Question: What is sound?

Book Hooks:

Sound Poems – Onomatopoeia – The Sound Collector

Overview of Learning

Pupils will explore and identify the way sound is made through vibration in a range of different musical instruments; and find out how the pitch and volume of sounds can be changed in a variety of ways. They will learn how vibrations cause sounds and how sounds travel through different mediums at different speeds. They will explore how sounds can change in pitch and loudness and be able to explain this using scientific language.

Knowledge and Understanding Objectives

Pupils should be taught to:

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

Key Vocabulary to Explain

vibrate/vibrations - forward and backward movement of an object (usually rapidly).
volume - how loud or quiet a sound is.
pitch - how high or low a sound is.
pinna - the outer portion of the ear (ear flap).
cochlea - the sound reception part of the inner ear.
ear drum - the membrane which collects sound from the pinna and passes it to the inner ear

Working Scientifically Objectives

- Set up simple practical enquiries, comparative and fair tests;
- report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions;
- use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions;
- make systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.

Previous Learning

KS1 – May have some knowledge of pitch and volume though the teaching of music.

Future Learning

KS3 - children will extend their understanding of sound by exploring frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound. They will build upon knowledge of how sound travels through a medium and explore the auditory range of humans and animals.

Stretch and Challenge Across the Curriculum

Find patterns in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses. Make earmuffs from a variety of different materials to investigate which provides the best insulation against sound. Make and play their own instruments by using what they have found out about pitch and volume.

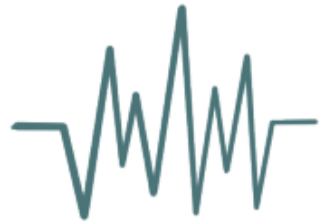
Assessment

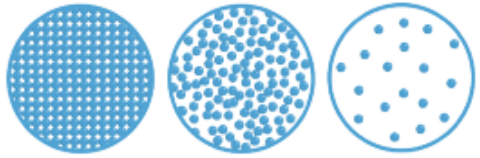
Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6	Lesson 7
Key question: How are sounds made?	**Key question:** What is a sound vibration?	**Key question:** What is inside your ear?	**Key question:** Does the size of the pinna affect the volume of the sound?	**Key question:** What is pitch?	**Key question:** What is volume?	**Key question:** Which material is best at muffling sound?
Learning objective: I can identify how sounds are made, associating some of them with something vibrating.	**Learning objective:** I can recognise that vibrations from sounds travel through a medium to the ear.	**Learning objective:** I can recognise that vibrations from sounds travel to the ear.	**Learning objective:** I can investigate if the size of the pinna affects the volume of the sound. I can report my findings from enquires.	**Learning objective:** I can find patterns between the pitch of a sound and features of the object that produced it	**Learning objective:** I can find patterns between the volume of a sound and the strength of the vibrations that produced it.	**Learning objective:** I can set up simple fair tests.
Success criteria: By the end of this lesson, children will be able to explain how sound is made and identify what is vibrating when sounds are made.	**Success criteria:** By the end of this lesson, children will be able to explain how vibrations from sounds travel through either solids, liquids or gases to the ear. They will use their knowledge of particle structure to explain why sound travels more quickly through solids when compared to gases.	**Success criteria:** By the end of this lesson, children will be able to describe the parts and functions of the outer, middle and inner ear.	**Success criteria:** By the end of this lesson, children will have planned a fair test investigation to answer the question: does the size of the pinna affect the volume of the sound. They will draw conclusions from the data collected and communicate the findings from their enquires.	**Success criteria:** By the end of this lesson, children will be able to explain what pitch is. They will have created a set of pan pipes and be able to describe the relationship between the length of the pipe and the pitch of the note.	**Success criteria:** By the end of this lesson, children have used a variety of instruments to explore how they can alter the volume. They may have used a data logger to record volume in decibels and be able to describe the relationship between the volume of a sound and the strength of the vibration.	**Success criteria:** After planning and conducting an investigation in response to the question – which material is the best at muffling sound, children communicate their findings by writing a letter.

Sound Knowledge Organiser

Sounds are made when objects vibrate. The **vibration** makes the air around vibrate, and the air vibrations enter your **ear.** You hear the **vibrations** as **sounds.** You cannot always see the vibrations, but if something is making a **sound,** a part of it is vibrating. The **vibrations** travel in all directions and they don't travel in **straight lines.**



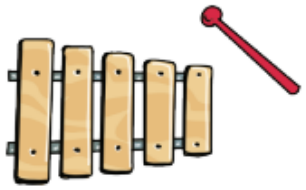


solid	liquid	gas

The vibrations caused by the sound can travel through the air **(gas)** but can also travel through **liquids and solids.**

Sounds can be **high** or **low.** We call this the pitch. The pitch of a sound is how high or low the **sound** is. A high sound has a high pitch and a low sound has a low pitch. The pitch of a sound is due to how many times the object **vibrates** each second. The higher the number of vibrations the higher the **pitch.**

We can change the **pitch** of the **sound** we make on different **instruments.**



End of topic test

1. Carly is listening to James playing his guitar. He plucks a string. What happens to the guitar string when it makes a sound?

2. Carly walks away from James and leaves the room. What happens to the loudness of the sound Carly hears as she goes further away from James?

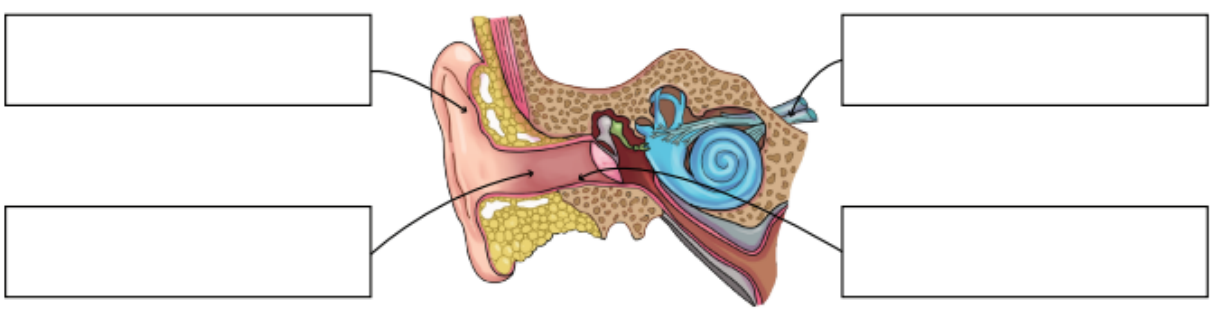
3. Carly shuts the door. She can still hear James playing his guitar in the next room. One material the sound travels through is air. Name ONE other material the sound must travel through for Carly to hear it.

4. Does sound travel faster through solids, liquids or gases? Circle one.

Solid	Liquid	Gas

Explain your answer.

5. Label the parts of the ear



6. Sam makes a string instrument. He ties the string tightly. He plucks the string. The instrument makes a sound.

   Sam plucks the string again. It sounds louder. How did Sam pluck the string with his finger to make it sound louder?

_____

_____

_____

_____

7. Clare looks carefully at the string as Sam plucks it. When Clare looks carefully at the string, what can she see that tells her the string is making the sound?

_____

_____

8. Polly has a straw. She cuts one end of the straw. She blows into the cut end of the straw. It makes a sound. The sound is caused by vibrations. Name TWO things that vibrate to cause this sound.

1. _____

2. _____

9. Polly thinks that changing the length of the straw may change how high or low the note is. What is the scientific name for how high or low a note is?

_____

10. Polly cuts four identical straws into different lengths.

Her friends blow gently into the straws. The note from each straw is different. Some notes are high and some are low.

Describe how the length of a straw affects how high or low the note is.

Y4 ELECTRICITY (PHYSICS)

Key Question: What is electricity?

Book Hooks:

The Shocking Story of Electricity – Anna Claybourne and Kevin Hopgood

Overview of Learning

Pupils will construct simple series circuits, trying different components, for example, bulbs, buzzers and motors, and including switches, and use their circuits to create simple devices. Pupils will learn how to draw the circuit as a pictorial representation. Pupils will be taught about precautions for working safely with electricity. p in a circuit.

Knowledge and Understanding Objectives

Pupils should be taught to:

- 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 a lamp will light in a simple series circuit, based on whether 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 a lamp lights in a simple series circuit;
- recognise some common conductors and insulators, and associate metals with being good conductors.

Key Vocabulary to Explain

appliance – a device or piece of equipment that has been made to perform a specific task
battery – a small item used to power small appliances
circuit – a route through which electricity flows
components – the parts of a circuit
conductor – allows electricity to flow through it
current – the rate of flow of electricity measured in amps
electrical – something that uses electricity to work
insulator – doesn't allow electricity to flow through it
mains power – electricity provided by power stations
portable – can be easily carried around
pylon – a tower used for keeping electrical wires above the ground
switch – a device for controlling the flow of electricity in a circuit

Working Scientifically Objectives

- Set up simple practical enquiries, comparative and fair tests;
- gather, record, classify and present data in a variety of ways to help in answering questions;
- make systematic and careful observations and where appropriate, take accurate measurements using standard units, using a range of equipment;
- draw conclusions; answer questions and describe the relationship between the height of a light source and the length of a shadow, and use results to make predictions for new values, suggest improvements and raise further questions.

Previous Learning

KS1 - Children do not study light as a separate topic. However, as part of seasonal changes topic, children will have observed and talked about changes in the weather and the seasons and will have talked about the dangers of looking at the Sun directly. **Year 2** - children might have observed the effect of light on plant growth

Future Learning

Year 6 – associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit; compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches; use recognised symbols when representing a simple circuit in a diagram.

Stretch and Challenge Across the Curriculum

Extended into a D & T project on designing a game - navigate a wire loop along a bent wire course without touching them together and completing the circuit. It can be designed in any shape and switches can be built in. Draw a circuit diagram for their game. Use simple apparatus to construct a set of traffic lights, with a single switch (which they construct themselves) turning two lights on and off in turn. Children create a suitable casing for their traffic lights. They consider how they could construct a 3-way traffic light. Write an explanation after results are collected, using scientific ideas to identify similarities and differences. Evaluate findings using F.A.R. Was it fair? Was it accurate? Was it reliable?

Assessment

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5
Key question: Which appliances use electricity?	**Key question:** How can I make a simple circuit?	**Key question:** Why don't some circuits work?	**Key question:** How can we test if a material is a conductor or an insulator?	**Key question:** How do switches affect a circuit?
Learning objective: I can identify common appliances that use electricity.	**Learning objective:** I can construct a simple circuit and name the parts of the circuit	**Learning objective:** I can identify if a bulb will light up in a circuit.	**Learning objective:** I can recognise common conductors and insulators.	**Learning objective:** I can investigate switches.
Success criteria: By the end of this lesson, children will be able to recognise and group which electrical appliances run off mains electric and which are battery powered. They will understand how mains electricity is transported from power stations and know why batteries run out of charge.	**Success criteria:** By the end of this lesson, children will be able to construct a variety of simple circuits using different components.	**Success criteria:** By the end of this lesson, children will be able to predict which circuits will work and which won't. They will be able to provide an explanation as to why a circuit will or won't work and make suggestions how a circuit can be fixed.	**Success criteria:** By the end of this lesson, children will recognise common conductors and insulators. They will plan and conduct an experiment to answer the question - How can we test if a material is a conductor or an insulator? They will use knowledge gained in the lesson to explain how insulators and conductors are used in everyday life.	**Success criteria:** By the end of this lesson, children will be able to explain how switches affect a circuit. They will use this knowledge to design and make a switch to control the flow of electricity in a series circuit and light a bulb.

Electricity Knowledge Organiser

Electrical Appliances

Lots of **appliances** around our house use **electricity** to work.



Most big appliances in our house have to be **plugged in**. These are powered by **mains power**. Some smaller appliances can be powered by **batteries**. Some appliances have batteries that need to be **charged** by mains power.

Battery Power

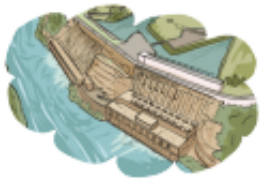
Battery powered appliances are **portable** which means you can use it anywhere without it having to be plugged into **a plug socket**. There are different types of battery for different appliances.




Mains Power

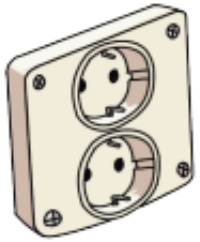
Mains power is produced mainly in a **gas**, **coal** or **nuclear power station**. **Wind turbines**, **solar panels** and **hydroelectric dams** are also used to produce mains power but are not used as often.



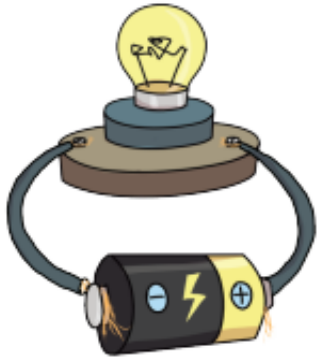


The electricity then travels from the **power stations** to our **houses** through **overhead wires** and **pylons**. We use the electricity in our house by plugging the appliance into **a plug socket**. Finally, the electricity enters the appliance's **electrical circuit** through the wires.





Simple Circuit



The circuit has to be complete to allow the **electricity** to travel all the way around it.

Insulators	Conductors
fabric	tin foil
plastic	tin can
paper	steel spoon
string	penny
wood	

Switches

When we put **a switch** in an electrical circuit and turn it to the on position, it completes the circuit and allows electricity to **flow** around the circuit. When we turn the switch to the **off position**, this creates a break in the circuit meaning the electricity **cannot flow** anymore and the appliance will not work.

paddle switch

push button switch

pull switch

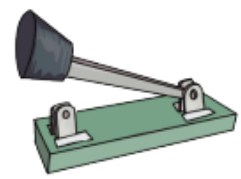
Key Vocabulary

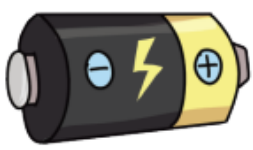
appliance – a device or piece of equipment that has been made to perform a specific task
battery – a small item used to power small appliances
circuit – a route through which electricity flows
components – the parts of a circuit
conductor – allows electricity to flow through it
electrical – something that uses electricity to work
insulator – doesn't allow electricity to flow through it
mains power – electricity provided by power stations
portable – can be easily carried around
pylon – a tower used for keeping electrical wires above the ground

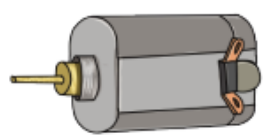
Y4 Electricity End of Topic Test

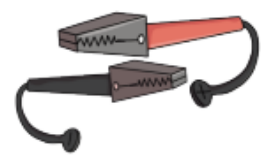
1. Name **five appliances** that use electricity. /5

2. Name **the components.** /6

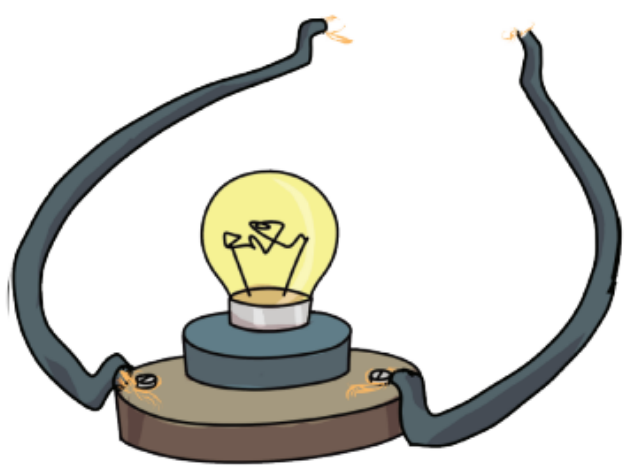




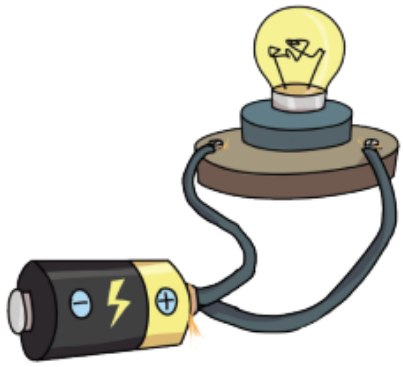




3. What am I missing from my **circuit**? Draw it in. /1

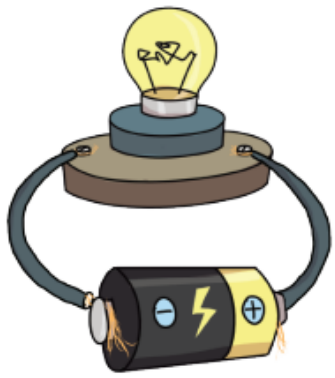


4. Will this bulb **light up**? YES/NO /1

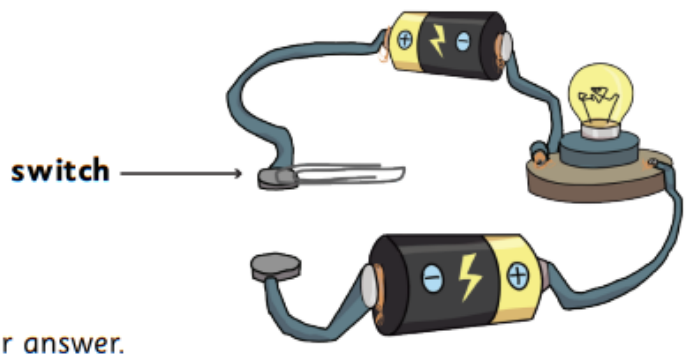


Explain your answer.

5. The bulb in this circuit **won't light up**. Give **two reasons** why it might not light up. /2



6. Will this **circuit work**? YES/NO /1



Explain your answer.

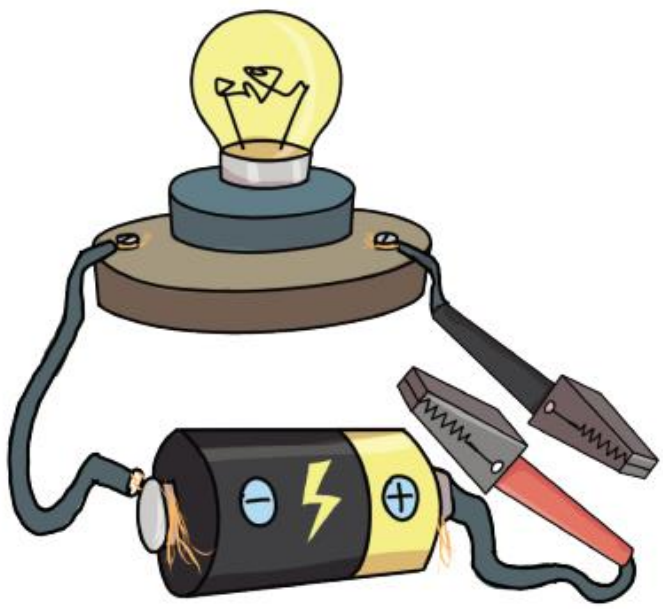
7. Why might you want to put a **switch** in a circuit? /1

8. Explain the meaning of these **scientific words.** /2

Conductor

Insulator

9. Sarah has **a cell** (battery), some **wire** and a **bulb.** She makes a simple circuit. /2



Sarah joins these **objects** into the circuit, to see if the bulb **lights**:

cork

iron nail

copper rod

plastic ruler

steel spoon

She records her **results** in this table.

Object	A	B	C	D	E
		spoon			
Bulb lights?	No	Yes	Yes	No	Yes

Complete the sentences below to say what **objects A and C are.**

Object A is either the _____ or the _____

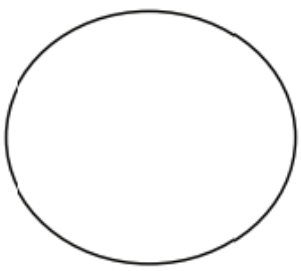
Object C is either the _____ or the _____

10. Some of the objects that Sarah used are **electrical insulators** and some are **electrical conductors.**

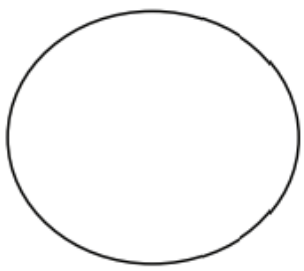
Use the information in **Sarah's table**. Write A, B, C, D and E in the **correct group** below to sort the objects.

/5

Insulator



Conductor



TOTAL TEST - /26

Year 5

Y5 LIVING THINGS AND THEIR HABITATS (BIOLOGY)

Key Question: How do living things reproduce and why is this important in a life cycle?

Book Hooks:

Cicada – Shaun Tan
Charlotte's Web – E.B. White

Overview of Learning

Pupils will study and raise questions about their local environment where they will observe life-cycle changes in a variety of living things. Pupils should find out about different types of reproduction, including sexual and asexual reproduction in plants, and sexual reproduction in animals. They will work scientifically by observing and comparing the life cycles of plants and animals in their local environment with other plants and animals around the world.

Knowledge and Understanding Objectives

Pupils should be taught to:

- describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird;
- describe the life process of reproduction in some plants and animals.

Key Vocabulary to Explain

fertilisation – the point at which the sperm from the pollen meets the egg in the ovary
pollination – the process by which the pollen reaches the stigma
pollen – granule that delivers the male genetic material to the female seed
stamen – the male part of the flower, comprising of the anther and filament
pistil – the female part of the flower consisting of the stigma, style and ovary
seed dispersal – the method used by a plant to spread out its seeds (usually by wind, water or animals)
reproduction – the combining of genetic material from two individuals to produce new life

Stretch and Challenge Across the Curriculum

Find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall. Grow new plants from different parts of the parent plant, for example, seeds, stem and root cuttings, tubers, bulbs. Observe life cycle changes in a variety of living things, for example, animals in the local environment. Research a variety of pollinators including mammals, amphibians, insects and birds. Discuss what they have found out, comparing the life cycles of the different pollinators. Search the internet to find information and footage of the life cycle of a frog (amphibian) comparing this to the life cycle of a butterfly. Articulate the differences in discussion, diagrams and written work. Research gestation periods of other animals and compare them to humans. How fast does a human baby grow compared to other animals? Worms and snails have both male and female parts. Research how they reproduce.

Working Scientifically Objectives

- record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter, bar and line graphs;
- report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.

Previous Learning

Recognise that living things can be grouped in a variety of ways; explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment; recognise that environments can change and that this can sometimes pose dangers to living things..

Future Learning

Year 6 – describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals give reasons for classifying plants and animals based on specific characteristics.
KS3 – extend knowledge of reproduction in humans and plants.

Assessment

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Key question: What are the seven life processes?	**Key question:** How do mammals reproduce?	**Key question:** Do animals reproduce in the same way?	**Key question:** How do plants reproduce?	**Key question:** What is a life cycle?	**Key question:** What are the stages in a life cycle of a plant?
Learning objective: I can discuss the seven life processes.	**Learning objective:** I can explain how mammals reproduce.	**Learning objective:** I can explain how animals reproduce.	**Learning objective:** I understand reproduction in plants.	**Learning objective:** I can describe the differences in the life cycles of mammals, amphibians, reptiles, insects and birds.	**Learning objective:** I can explain the life cycle of plants.
Success criteria: By the end of this lesson, children will be able to name each of the seven life processes using the acronym MRS GREN. They will be able to explain how animals and plants complete each of the life processes and be able to distinguish living from non-living objects using this knowledge.	**Success criteria:** By the end of this lesson, children will be able to name the five animal groups and understand that the way each of those groups reproduce may be different. They will be able to explain how mammals reproduce and understand that the gestation periods for different mammals may vary.	**Success criteria:** By the end of this lesson, children will be able to name the five animal groups and understand that the way each of those groups reproduce may be different. They will be able to explain which groups of animals lay eggs and which do not and compare groups of animals that look after their young with those that don't.	**Success criteria:** By the end of this lesson, children will be able to explain the process of pollination and fertilisation. They will be able to label parts of a flower and understand the purpose of each part. They will be able to explain what seed dispersal is and name some seed dispersal methods.	**Success criteria:** By the end of this lesson, children will be able to describe the differences and similarities in the life cycles of mammals, amphibians, reptiles, insects and birds.	**Success criteria:** By the end of this lesson, children will be able to describe and order the stages in the life cycle of a strawberry and/or dandelion plant. They will compare similarities and differences between the two cycles.

Living Things & their Habitats

Life processes

There are seven things that all living things do. These are called **life processes.**

'MRS GREN' will help you remember!

Movement
Respiration
Sensitivity

Growth
Reproduction
Excretion
Nutrition

Mrs Gren

All living **things move.**
All living things take in **gas** and release gas. Being able to **hear, see, smell, feel and taste.**

To get **larger** or **taller.**
Having **offspring.**
Getting rid of **waste** products.
Consuming **food** for energy.

The five animal groups

Mammals

Hair on body
Mother produces milk for offspring

Reptiles

Scaly skin
Born on land
Cold-blooded

Amphibians

Born in the water
As they grow older, they develop lungs so they can live on land.

Birds

All have feathers
Most can fly and have wings.

Fish

Live in water
Have fins and scales
Use gills to take in gas

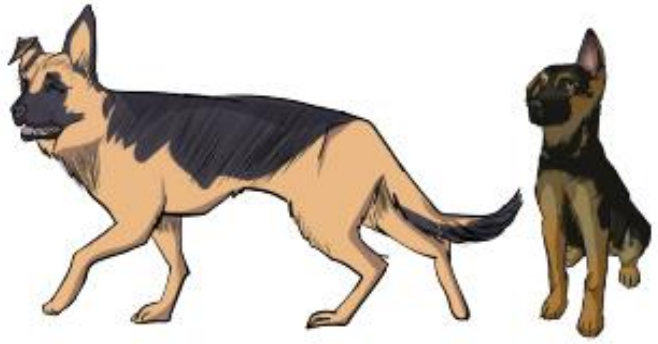
Reproduction in animals

Reproduction is the process in which living things create offspring (children or babies). Offspring will have DNA from their parents and have similar characteristics.

Mammals

A mammals **offspring grows inside** the mother's womb.
The mother provides nutrients and oxygen to the foetus (unborn baby).
When a mammal carries a foetus **it is pregnant.**

In order to **create a baby,** two mammal parents (a male and a female) are needed. A male **sex cell,** called **a sperm,** fertilises the female sex cell, called **an egg.**



Birds and Reptiles

Birds and reptiles **lay eggs.**
The shell **protects** the baby and when it is ready they will break out of **the shell.**
Baby birds will be **looked after** by their mothers, whereas adult reptiles **do not look after** their **babies.**

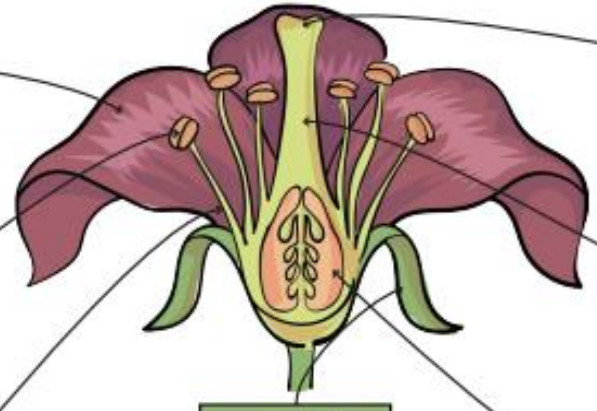
Amphibians and fish

Fish and most amphibians also **lay eggs** but in water. Eggs laid by amphibians are **called spawn.** Fish lay **hundreds of eggs** and when they hatch they look **after themselves.**

Reproduction in plants

The Flower

The flower's main job is to create new **seeds to grow new plants.** There are lots of **different parts** of the flower.



petal

Brightly coloured to attract **insects**.

anther

Contains the **pollen**.

filament

Holds the **anther** up.

sepal

Protects the **flower** when it starts to grow.

stigma

Sticky to catch the **pollen** grains.

style

Holds up the **stigma**. Pollen travels down it to the **ovary**.

ovary

Where the **seeds** are formed.

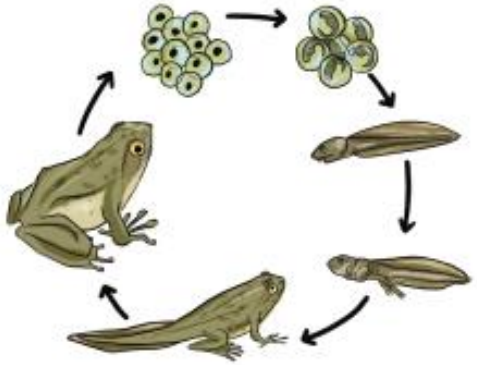
Pollination and seed dispersal

Pollination is when **pollen** from the anther is **transferred** to **the stigma.** This can happen **by wind** or **by a pollinator** such as **a bee** or **a butterfly.** Once the pollen is transferred to the stigma, it travels down the style to **the ovary** where the seed grows. Seeds are then dispersed and will grow in **different places.** Seeds can be dispersed by exploding plants, wind, water or animals.

Life Cycles?

All plants and animals have **a life cycle** but they are different depending on the type of **animal or plant.** Here are some examples:

Frog life cycle

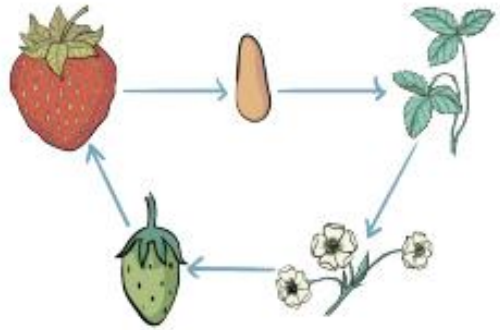


Butterfly life cycle

Dandelion life cycle

Human life cycle

Strawberry life cycle



Y5 Living Things and Their Habitats
End of Topic Test

1. What is a **life cycle?**

_____

_____

2. Match the animal group to how it **produces offspring.**

bird	Eggs are laid in water.
reptile	Offspring develop in the womb of the mother.
fish	Eggs are laid but not in water.
amphibian	
mammal	

3. When the foetus is **developing the womb** of a mammal, what is the purpose of the **umbilical cord?**

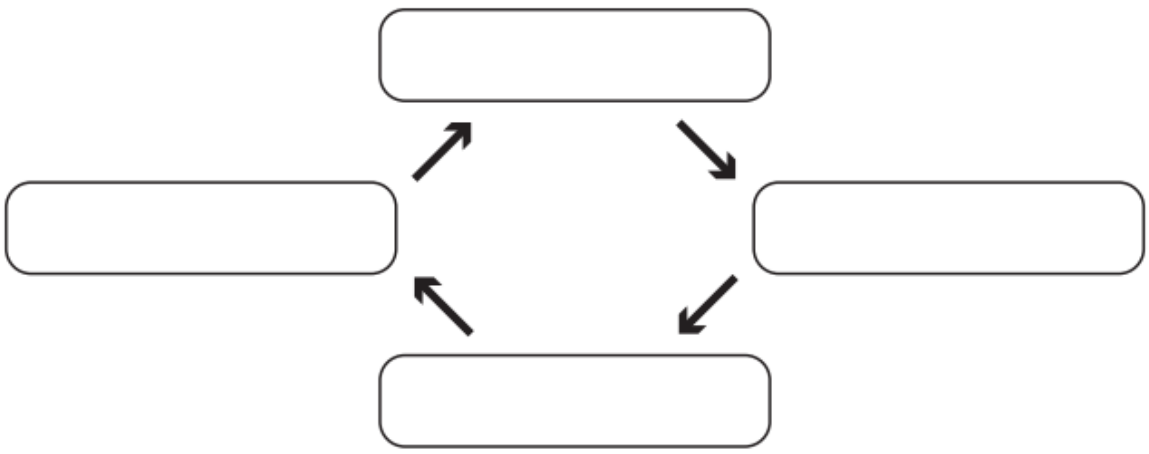
_____

4. Why must seeds be **dispersed far and wide?**

_____

_____

5. Put this **life cycle** in order. (egg, butterfly, caterpillar, cocoon)



6. How is the butterfly life cycle different to the **human life cycle?**

7. Why do we draw some life **cycles as a circle** with no beginning and no end?

8. Why do some animals look **after their young but others don't?**

Y5 ANIMALS INCLUDING HUMANS (BIOLOGY)

Key Question: How do we change as we grow older?

Book Hooks:

Aqualine The Water Dragon – Rowena Robins

Overview of Learning

Pupils will draw a timeline to indicate stages in the growth and development of humans. They will learn about the changes experienced in puberty.

Knowledge and Understanding Objectives

Pupils should be taught to:

- describe the changes as humans develop to old age.

Key Vocabulary to Explain

birth – when your life starts as a physically separate being
conception/fertilisation – when the egg and the sperm meet to begin the development of a foetus
death – when the life cycle ends
develop – to grow to become more mature or advanced
egg – the female sex cell
foetus – a baby that is still developing in the womb
puberty – a time in the human life cycle when the body goes through changes to become an adult
sperm – the male sex cell
womb – an organ in which the foetus grows and develops

Stretch and Challenge Across the Curriculum

Work scientifically by researching the gestation periods of other animals and comparing them with humans; by finding out and recording the length and mass of a baby as it grows. Analyse and report findings in written explanations. Complete a **table** showing the gestation periods of 10 different mammals. They round each gestation period to the nearest 10 days and use this to **create a bar chart**. They look for patterns and identify which mammal has the longest gestation period. Complete a **table** by rounding the weight of an embryo/foetus at various stages of gestation to the nearest 100g. They use this information to **complete a line graph**. Children discuss at which point the foetus gained the most weight. Complete **2 diagrams**, one for each gender, explaining some of the changes involved with puberty. Complete a **diagram**, explaining some body features which are exclusive to adult men, some body features which are exclusive to adult women, and body features which are common to both adult men and adult women. Nurse visit.

Working Scientifically Objectives

- Plan different scientific enquiries to answer questions, including recognising and controlling variables where necessary;
- take measurements using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate;
- record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, and bar and line graphs;
- use test results to make predictions to set up further comparative and fair tests;
- report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations;
- Identify scientific evidence used to support or refute ideas or arguments.

Previous Learning

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

Future Learning

Year 6 – identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood; recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function; describe the ways in which nutrients and water are transported within animals, including humans.
KS3 – study reproduction in more detail in humans and other animals.

Assessment

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4
Key question: How do humans change throughout their life?	**Key question:** How do we develop in the womb?	**Key question:** How do we change through puberty?	**Key question:** How do humans change as we become senior?
Learning objective: I can describe the human life cycle.	**Learning objective:** I understand how a foetus develops in the womb.	**Learning objective:** I can describe what happens when I am a teenager.	**Learning objective:** I can describe what happens when I am a senior.
Success criteria: By the end of this lesson, children will be able to name and describe the main stages of the human life cycle.	**Success criteria:** By the end of this lesson, children will be able to explain how the foetus grows in the womb at different stages.	**Success criteria:** By the end of this lesson, children will be able to explain what puberty is and how human bodies change during puberty.	**Success criteria:** By the end of this lesson, children will be able to explain what it means to be a senior and describe the changes we might face.

Animals including Humans

Human Life Cycle


baby


toddler


child


teenager


adult


senior

Baby

- cannot walk
- cannot talk
- cannot control bladder
- mostly drink milk

Child

- grow and learn
- start school
- learn new skills
- lose their "baby" teeth

Adult

- finished growing
- responsibilities
- can still learn
- marriage and babies

Toddler

- start to talk
- start to crawl
- start to walk
- begin to explore the world around

Teenager

- go through lots of changes
- bodies change
- spots may develop
- puberty

Senior

- fitness levels decline
- may struggle with everyday activities
- may grow grey hair
- final stage of the human life cycle

Puberty

Puberty is a time in our lives when our bodies **change** from a child into an adult. This time happens during our **teenage years**.

You may **sweat** more. When sweat mixes with bacteria on your skin, it can smell or cause **bad odour (BO)**. It is important to **wash** regularly.

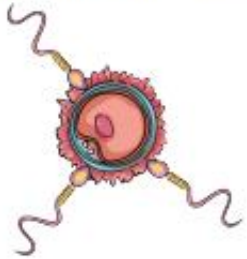
You may develop **spots** on your face, neck, back or chest. Some people develop lots of spots and some hardly any. It is completely **normal**.

Hair **grows** in new places such as under your armpits. Boys also grow **facial hair** like beards and moustaches.

Puberty can be a very emotional time due to the changes in **hormones** in your body. We may feel more upset or angry than usual. It is important to **talk** about these **emotions** with someone you trust.

In the Womb

Fertilisation happens when a male sex cell and a female sex cell combine and begin to grow into a ***foetus***.
Women have a special organ called a **womb** which they grow the foetus in until the baby is ready to be born. Human babies develop for **9 months** in the womb.



Key Vocabulary

Birth - when your life starts as a physically separate being
Conception - when the egg and the sperm meet to begin the development of a foetus
Death - when the life cycle ends
Develop - to grow, to become more mature or advanced
Egg - the female sex cell
Fertilisation - when the egg and the sperm meet to begin the development of a foetus
Foetus - a baby that is still developing in the womb
Puberty - a time in the human life cycle when the body goes through changes to become an adult
Sperm - the male sex cell
Womb - an organ in which the foetus grows and develops

Y5 Animals Including Humans

1. Can you name the **six stages** of the human life cycle?

2. **Match** the word to its meaning

foetus	This is what we call a **baby** that has not been born yet that is still **developing** in the **womb**.
puberty	When the **egg** and the **sperm** meet to produce a **foetus**.
fertilisation	The period of time when a child's body **matures** into an adult body.

3. When the foetus is developing in the womb, what is **the purpose** of the **umbilical cord**?

_____

4. Toddlers learn by **exploring**. Name **three things** that toddlers might do for the first time.

_____

_____

5. Which of these happen during **puberty**? **Circle** all correct answers.

Hair grows under arms.

Hair changes colour.

Boys grow facial hair.

You can get spots or acne.

You are happy all the time.

6. One thing that can happen during puberty is that you **sweat** more. If this mixes with **bacteria** on your skin it can cause **B.O (body odour)**. What can you do to **help** prevent this?

_____

_____

7. True or False?

All old people need **walking sticks**.	
If you look after your **teeth**, you can keep them through your senior years.	
Some old people may need **support** with everyday activities.	
Everyone **ages** in the same way.	

8. If you were stuck at **one stage** of the human life cycle, which stage would you **prefer** to be stuck at and why?

Y5 PROPERTIES AND CHANGES OF MATERIALS (CHEMISTRY)

Key Question: How do materials change?

Book Hooks:

Itch – Simon Mayo
Stormbreaker – Anthony Horrowitz

Overview of Learning

Pupils will build a more systematic understanding of materials by exploring and comparing the properties of a broad range of materials. They will explore reversible changes, including, evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes. Pupils will explore changes that are difficult to reverse, for example, burning.

Knowledge and Understanding Objectives

Pupils should be taught to:

- compare and group together everyday materials based on their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets;
- know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution;
- use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating; give reasons, based on evidence from comparative and fair tests, for the uses of everyday materials, including metals, wood and plastic;
- demonstrate that dissolving, mixing and changes of state are reversible changes;
- explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

Key Vocabulary to Explain

soluble - a substance that will dissolve in water
insoluble - a substance that will not dissolve in water
saturation - the point at which no more solute can be dissolved
solution - a soluble solid is dissolved in liquid to form a solution
filtration - the collection of larger particles in a mixture
boiling - the process by which molecules of a liquid change to vapour (much faster change than evaporation)
condensing - the change of vapour into a liquid
evaporation - change from a liquid to a vapour
freezing - the change of a liquid to a solid
melting point - the point at which a solid substance liquefies
chemical change - one where the molecular structures of the combined substances are broken down and recombined to make a new substance
physical change - where the molecular structures of the combined substance stay separate, allowing separation to occur
reversible change - a physical change that we can undo
irreversible change - a physical change that we cannot undo

Working Scientifically Objectives

- Plan different scientific enquiries to answer questions, including recognising and controlling variables where necessary.;
- take measurements using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate;
- record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, and bar and line graphs;
- use test results to make predictions to set up further comparative and fair tests;
- report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations;
- identify scientific evidence used to support or refute ideas or arguments.

Previous Learning

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

Future Learning

KS3 – Particulate nature of matter, atoms, elements and compounds; pure and impure substances are, including simple techniques for separating materials (filtration, evaporation, distillation and chromatology; chemical reactions (catalyses, combustion, etc.) and represent them using formulae and equations.

Stretch and Challenge Across the Curriculum

- find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton. Make- chocolate crispy cakes. Visit to Secondary (Ormiston Venture).

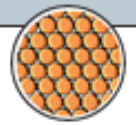
Assessment

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6	Lesson 7
Key question: What are the properties of solids, liquids and gases?	**Key question:** How can I describe the properties of materials?	**Key question:** Which materials make the best thermal insulators?	**Key question:** Which materials are magnetic?	**Key question:** Which materials are soluble and which are insoluble?	**Key question:** How can mixed materials be separated?	**Key question:** What is irreversible change?
Learning objective: I can compare and group materials according to whether they are solids, liquids or gases and name their properties.	**Learning objective:** I can describe the properties of materials using scientific vocabulary.	**Learning objective:** I can investigate the thermal insulation of different materials.	**Learning objective:** I can compare and group materials based on their response to magnets.	**Learning objective:** I know that some materials dissolve in a liquid to make a solution.	**Learning objective:** I can predict how I could separate mixtures.	**Learning objective:** I can explain why some changes are irreversible.
Success criteria: By the end of this lesson, children will be able to name examples of solids, liquids and gases, identifying the properties of each type of material. They will understand how states of matter change and name some of these processes.	**Success criteria:** By the end of this lesson, children will be able to describe the properties of materials using the scientific vocabulary taught in the lesson.	**Success criteria:** By the end of this lesson, children will be able to plan and conduct a fair test investigation to answer a question about thermal insulation. They will interpret their results and conclude using scientific vocabulary.	**Success criteria:** By the end of this lesson, children will be able to predict, test and group materials according to their magnetic properties.	**Success criteria:** By the end of this lesson, children will know that some materials dissolve in a liquid to make a solution. They will be able to explain the process of dissolving using scientific vocabulary (soluble, insoluble, solution) and understand that solutions have a saturation point.	**Success criteria:** By the end of this lesson, children will understand that they can separate some mixed materials through various processes (evaporation, filtering, sieving or using magnets). They will be able to predict how they could separate mixtures depending on the properties of the mixed materials.	**Success criteria:** By the end of the lesson, children will be able to identify the difference between irreversible and reversible change. They will be able to give examples of each type of change.

Materials Knowledge Organiser

Solid



- stay in one place
- keep their shape
- do not flow
- always take up the same amount of space
- do not spread out
- can be cut or shaped

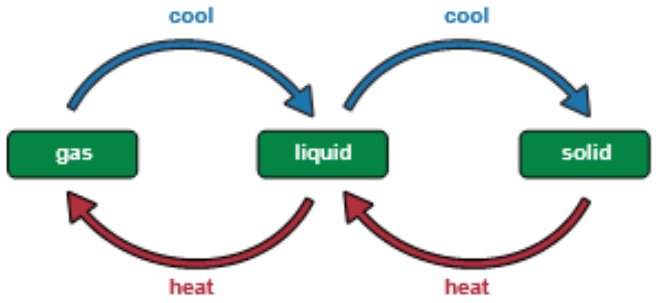
Liquid

- can flow or be poured
- not easy to hold
- change their shape to fit the container they are in
- take up the same amount of space
- volume stays the same

Gas

- often invisible
- do not keep shape
- do not take up the same amount of space
- can change shape and volume
- can be squashed

States of matter can change when they are heated or cooled.



Words to describe materials:

- hard
- soft
- durable
- flexible
- transparent
- absorbent
- waterproof
- magnetic
- translucent
- opaque

Different materials are suitable for different jobs because of their qualities and properties.

For example, rubber is a good material for tyres because it is **durable.**

Irreversible changes

Irreversible changes are when you cannot get the original materials back again. Heating and chemical reactions can both cause irreversible changes.

making toast

baking a cake

Separating materials

evaporation – used for separating a soluble solid and a liquid

sieving – used for separating two solids

magnets – used for separating magnetic and non-magnetic materials

filtration – used for separating a liquid and a solid

Solutions

A **solution** is made when a material dissolves in a liquid. Sugar and water are **soluble** materials. An **insoluble** material does not dissolve in liquid, such as sand. Materials in a solution can be separated by **evaporation.**

Y5 Properties and Changes of Materials End of Topic Test

1. Solids, liquids and gases have different **properties.** Complete the table to show these properties. Some rows may need more than one tick.

Property	Solid	Liquid	Gas
takes shape of the container it is in			
flows easily			
can be rigid or stiff			

2. Explain the meaning of these words.

Durable

Flexible

Transparent

3. What is the process called when sugar **'disappears'** into the water?

_____

4. Some changes that happen can be **reversed.** What type of change is this?

_____

5. We can separate some materials that have been mixed together. Choose the most appropriate method to **separate** these materials.

Paper clips and sugar _____

Salt and water _____

Raisins and porridge oats _____

Sand and water _____

sieving, filtration, evaporation, magnets

6. Some changes cannot be reversed. What type of change is this?

_____

7. Which of these is a change that cannot be **reversed?** (Circle one)

melting chocolate **making ice cubes** **making toast**

Explain why this is a change that cannot be reversed.

_____

_____

8. Tim has a glass **measuring** jug to measure liquids when cooking.
   Why is glass a good material for a measuring jug?

9. Tim also has a wooden spoon to stir things that are cooking in the pan.
   Why is wood a good **material** for a spoon?

10. Catherine thinks paper is the best material to make a drinking straw.
    Her friend Sarah disagrees and thinks that plastic is the best material.
    How could you **investigate** who was right?

Y5 EARTH AND SPACE (PHYSICS)

Key Question: What is the Solar System?

Book Hooks:

Cosmic by Frank Cottrell Boyce
The Jamie Drake Equation by Christopher Edge

Overview of Learning

Pupils will be introduced to a model of the Sun and Earth that enables them to explain day and night. They will learn that the Sun is a star at the centre of our solar system and that it has eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006). They will understand that a moon is a celestial body that orbits a planet (Earth has one moon; Jupiter has four large moons and numerous smaller ones). They will be able to describe the movement of Earth (and other planets) in relation to the Sun. Children will discover why there is day and night on Earth and relate this to time.

Knowledge and Understanding Objectives

Pupils should be taught to:

- describe the movement of the Earth, and other planets, relative to the Sun in the solar system;
- describe the movement of the Moon relative to the Earth;
- describe the Sun, Earth and Moon as approximately spherical bodies;
- use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.

Key Vocabulary to Explain

orbit – the rotation that one body in space takes around another when under gravitational influence
axis – an imaginary line going through a central body that most bodies in space rotate around
day – length of time the Earth takes to rotate on its axis
once a month – the length of time the Moon takes to complete one orbit around the Earth (not exactly equal to a calendar month)
planet – a non-luminous body that orbits a star
solar system – the name given to the Sun and all the bodies orbiting around it
year – the period the Earth takes to complete one orbit of the Sun
gravity – the force of attraction between two masses

Working Scientifically Objectives

- Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary;
- take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate;
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter, bar and line graphs;
- report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations;
- identify scientific evidence that has been used to support or refute ideas or arguments.

Previous Learning

Y3 – The Sun is a light source and the Sun's position appears to change through the day (Light topic).

Future Learning

KS3 - Extend their knowledge of gravity as a force and that gravity is there are other stars in our galaxy and other galaxies; seasons and the Earth's tilt, length of day at different times of the year, in different hemispheres and that a light year is a unit of astronomical distance.

Stretch and Challenge Across the Curriculum

Find out about the way that ideas about the solar system have developed, understanding how the geocentric model of the solar system gave way to the heliocentric model by considering the work of scientists such as Ptolemy, Alhazen and Copernicus. In computing, compare the time of day at different places on the Earth through internet links and direct communication. In D.T., create simple models of the solar system; constructing simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day.

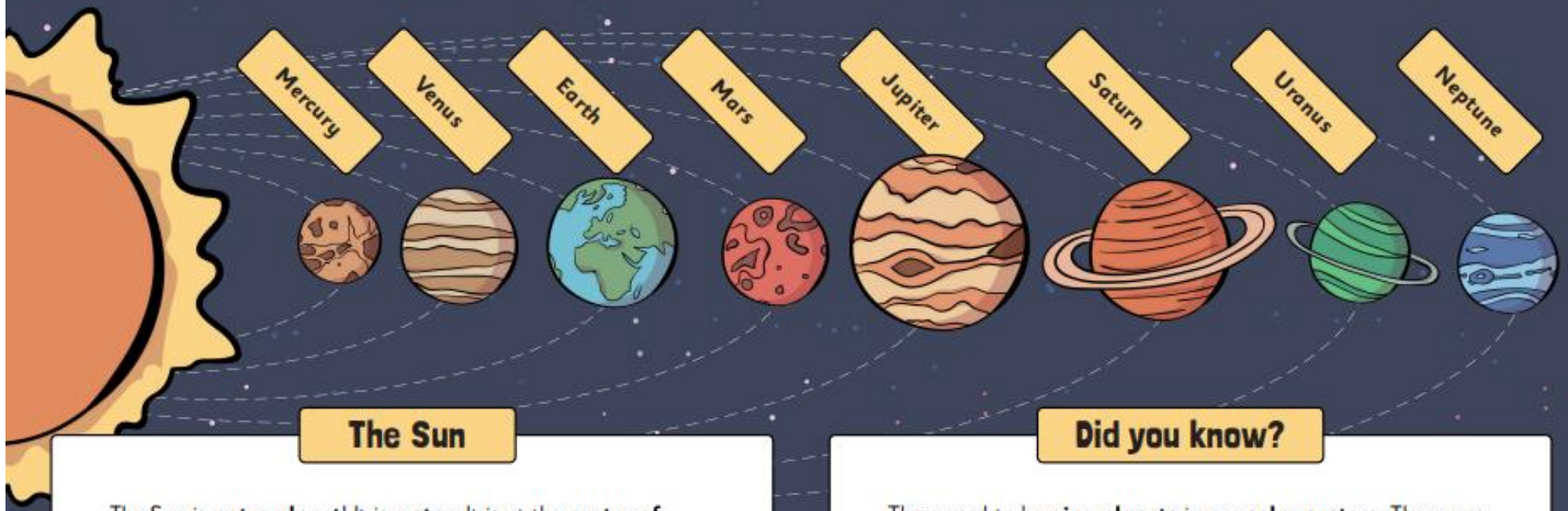
Assessment

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Key question: What are the names of the planets in the solar system?	**Key question:** How do we know the Earth is a sphere?	**Key question:** How long does it take for Earth (and other planets) to orbit the Sun once?	**Key question:** What is the largest object that orbits the Earth?	**Key question:** Why is there day and night on Earth?	**Key question:** Does the Moon change shape?
Learning objective: I can describe the planets in the solar system	**Learning objective:** I can describe the Sun, Earth and Moon as approximately spherical bodies.	**Learning objective:** I can describe the movement of the Earth, and other planets, relative to the Sun in the solar system.	**Learning objective:** I can describe the movement of the Moon relative to the Earth.	**Learning objective:** I can use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.	**Learning objective:** I can describe the movement of the Moon relative to the Earth.
Success criteria: By the end of this lesson, children will be able to name the planets in the solar system based on their distance from the Sun. They will understand that the Sun is a star (not a planet). They will know some facts about a chosen planet.	**Success criteria:** By the end of this lesson, children will be able to describe the Earth as a spherical body. They will understand how it was discovered that the Earth was round and not flat by the Greek philosopher Aristotle.	**Success criteria:** By the end of this lesson, children will be able to describe the movement of the Earth, and other planets relative to the Sun. They will understand that a year is the amount of time it takes for a planet to orbit the Sun once, and it is different for each planet. They will be able to complete a maths activity that links to the time taken for each planet to orbit the sun.	**Success criteria:** By the end of this lesson, children will be able to describe the movement of the Moon in relation to the Earth. They will learn that the Moon is the largest object that orbits the Earth and that we only see one side of the Moon from Earth. Children who complete the challenge activity, will research facts about the Moon.	**Success criteria:** By the end of this lesson, children will be able to explain why there is day and night on Earth. They will work in groups to plan a fair investigation to answer the question – What happens to the Sun during the day? They will make predictions and draw conclusions using scientific knowledge gained in the lesson.	**Success criteria:** By the end of this lesson, children will be able explain why the Moon appears to change shape. They will be able to describe the movement of the Moon relative to Earth and name some of the phases of the Moon.

Earth and Space Knowledge Organiser

In our solar system, there are **eight planets**. They **all orbit the Sun,** which sits in the centre. The **planets closest to the Sun** are the **hottest**, and the **planets furthest away** are the **coldest**. Our planet, **Earth**, is just the **right temperature for life.** Earth is the **only planet** in **our solar system** that has **life**.



The Sun

The Sun is **not a planet**! It is a **star**. It is at the **centre of our solar system** and gives **light** and **heat** to all the planets in it. It also has a **gravitational pull** that keeps all the planets in orbit around it.

Did you know?

There used to be **nine planets** in our **solar system**. There was a planet called **Pluto** that was even further away than Neptune. Pluto used to be a planet until scientists deemed it **'too small'** as some other planets' moons were bigger than it. It is now categorised as a **dwarf planet** instead.

Orbits

All the planets in our solar system **orbit the Sun**. The Sun is at the **centre of our solar system**. Each planet takes a different amount of time to orbit the Sun, depending on how far away it is and how slowly it moves.
Planets orbit the Sun because of **gravity**. The Sun's gravitational pull keeps all the planets in orbit. Planets travel on an **elliptical path** around the Sun, which keeps them from falling into the Sun. Below is a table showing how long each planet takes to orbit the Sun.

Mercury	**87.97 Earth days**
Venus	**224.70 Earth days**
Earth	**365.25 Earth days**
Mars	**686.98 Earth days**
Jupiter	**4332.82 Earth days**
Saturn	**10,755.70 Earth days**
Uranus	**30,687.15 Earth days**
Neptune	**60,190.03 Earth days**

Did you know?

People used to think the Earth was flat! Around **350 BC**, a scientist named **Aristotle** proved it was a **sphere**.

Key Vocabulary

dwarf planet - a small planet
friction - the force that acts upon one surface when it moves against another
gravity - a pull force that acts at a distance
orbit - the curved path around a star, planet or moon
planet - an object in space that orbits a star
pull - to move something towards
push - to move something away
solar system - the name given to our Sun and eight planets and their moons
star - an object in space made of luminous plasma (bright gas) held together by its own gravity

Moons

We are not the only planet with a moon.
Some planets have more moons than us!
Mercury and Venus - **0** moons
Earth - **1** moon
Mars - **2** moons
Jupiter - **79** moons
Saturn - **82** moons
Uranus - **27** moons
Neptune - **14** moons

Y5 End of Topic Earth and Space Test

1. **Astronauts** travel to the **Moon** in a **spacecraft**. **Rocket engines push** the **spacecraft** away from the **Earth**.

   What name is given to the force that tries to pull the spacecraft back to Earth?

   _____

   _____

2. From the Earth, the **Moon looks like a circle**.
   The astronauts know this is **not its actual shape**.

   What shape is the Moon?

   _____

3. The Moon orbits the Earth. Tick **ONE** box to show how many **days** it takes the **Moon to orbit the Earth**.

   1 day ☐ **7 days** ☐ **28 days** ☐ **365 days** ☐

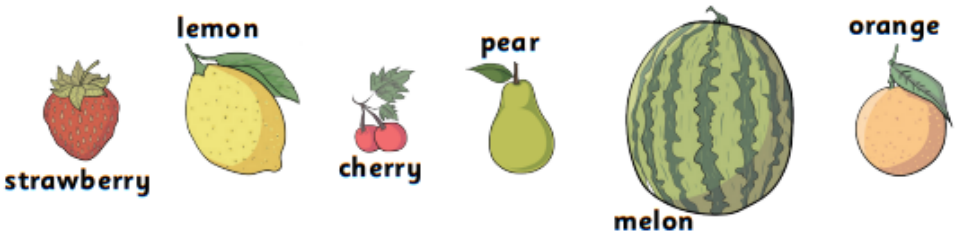
4. The astronauts can see the Earth from space. On **one half** of the Earth, it is **night**. On the **other half**, it is **day**.

   How does the Earth move to cause night and day?

   _____

   _____

5. Sarah is using fruit to model the **Sun**, **Earth** and **Moon**.



Complete the table to show the best fruit for modelling the Sun, Earth and Moon. Think about the size and shape.

Object in space	Sun	Earth	Moon
Which fruit should be used for the model?			

6. Jason is in the playground on a sunny day. Tick **ONE** box to show when Jason's **shadow will be shortest**.

- **before school: 8.30 – 9.00 am** ☐
- **morning break: 10.30 – 10.45 am** ☐
- **lunch break: 12.00 – 1.00 pm** ☐
- **afternoon break: 2.30 – 2.45 pm** ☐
- **after school: 3.30 – 3.45 pm** ☐

7. Tick **ONE** box to show which **movement in space** causes Jason's shadow to change **length during the day**.

☐ **the spin of the Earth**

☐ **the spin of the Sun**

☐ **the Earth orbiting the Sun**

☐ **the Moon orbiting the Earth**

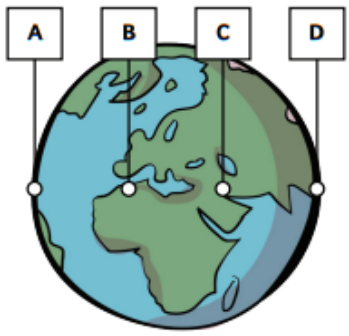
8. Adele's class is learning about space. Write **Earth**, **Sun** or **Moon** next to each sentence to show what it is describing.

It is a light source. _____

It takes 24 hours to spin on its axis. _____

Its orbit takes 28 days. _____

9. Adele uses a **torch** to represent the **Sun**. She points it towards a **globe** to show **night and day**.



Draw **FOUR** lines below to show what time it would be at each place on the globe.

A	**midnight**
B	**midday**
C	**6 pm**
D	**3 pm**

10. Joe finds out that days and years take **different amounts of time on different planets**. Look at the table.

Planet	Time for one day (Earth days)	Time for one year (Earth days)
Mercury	**59**	**88**
Venus	**243**	**225**
Earth	**1**	**365**
Mars	**1**	**687**
Jupiter	**0.4**	**4329**

Which planet has the shortest day? _____

Which planet orbits the Sun quickest? _____

Y5 FORCES (PHYSICS)

Key Question: Are there different types of forces?

Book Hooks:

Newton's Rainbow: – Kathryn Laskey The Gravity Tree: The True Story of a Tree That Inspired the World – Anna Crowley Redding

Overview of Learning

Pupils will explore falling objects and raise questions about the effects of air resistance. They will explore the effects of air resistance by observing how different objects such as parachutes and sycamore seeds fall. They will experience forces that make things begin to move, get faster or slow down. Pupils will explore the effects of friction on movement and find out how it slows or stops moving objects. They will explore the effects of levers, pulleys and simple machines on movement.

Knowledge and Understanding Objectives

Pupils should be taught to:

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

Key Vocabulary to Explain

Force – a push or pull that acts upon an object that can cause it to move, change shape or change direction.
Friction – the force that acts upon one surface when it moves against another.
Gravity – a pull force that acts at a distance.
Pull – to move something towards .
Push -– to move something away.
Repel – to push away.
Resistance – an opposing or slowing force.
Drag – the frictional force experienced by an object moving through a fluid or air.
Streamlined – a shape which minimises the profile presented by an object to minimise the resistance it encounters when moving through a liquid or gas.
Upthrust or buoyancy – the upward force exerted on a body by a fluid that surrounds it, equal and opposite to the weight of the water displaced.
Newton (N) – the unit used to measure force.
Gear –two wheels with serrated or notched rims that mesh to transfer movement.
Lever – usually a rigid bar with a pivot point close to one end, allowing movement at one end of the lever to be converted into a smaller movement at the other, which effectively magnifies the force applied.
Pulley – a wheel with a grooved rim that allows the transfer of movement via a belt or band.

Working Scientifically Objectives

- Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary;
- take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate;
- record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs;
- use test results to make predictions to set up further comparative and fair tests;
- report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.

Previous Learning

KS1 - Children do not study light as a separate topic. However, as part of seasonal changes topic, children will have observed and talked about changes in the weather and the seasons and will have talked about the dangers of looking at the Sun directly. **Year 2** - children might have observed the effect of light on plant growth

Future Learning

KS3– Extend their understanding of forces by describing motion (speed = distance ÷ time) and use time and distance graphs; use force arrows in diagrams, adding forces in one dimension. Further explore balanced and unbalanced force; opposing forces and equilibrium; extend their understanding of the difference between weight and mass and how gravity affects weight.

Stretch and Challenge Across the Curriculum

Find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation. Explore falling paper cones or cup-cake cases and designing and making a variety of parachutes and carrying out fair tests to determine which designs are the most effective. Design and make products that use levers, pulleys, gears and/or springs and explore their effects. Create a Balloon Buggy - make their own balloon powered car. Cars may be modified by groups and then raced to see which is the fastest.

Assessment

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Key question: What is gravity?	**Key question:** What is friction?	**Key question:** Whose shoe has the greatest friction?	**Key question:** What is air resistance?	**Key question:** What is water resistance?	**Key question:** What are gears, levers and pulleys?
Learning objective: I can explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and falling objects.	**Learning objective:** I can identify the effect of friction between moving surfaces.	**Learning objective:** I can plan different types of scientific enquiries to answer questions, including recognising and controlling variables. I can take measurements using a range of scientific equipment.	**Learning objective:** I can identify the effect of air resistance.	**Learning objective:** I can identify the effect of water resistance.	**Learning objective:** I can recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect.
Success criteria: By the end of this lesson, children will be able to describe the force of gravity and talk about the work of Sir Isaac Newton. They will plan a fair test to answer the question; do objects fall at the same rate?	**Success criteria:** By the end of this lesson, children understand that friction is a force that acts between two surfaces or objects that are moving. They will be able to identify scenarios in which friction is a useful force and scenarios where friction is an unhelpful force.	**Success criteria:** By the end of this lesson, children will be able to plan an investigation to answer the question – whose shoe has the greatest friction? They will use their results to draw conclusions.	**Success criteria:** By the end of this lesson, children will understand that air resistance is a type of frictional force that slows an object down when travelling through air. They will plan an investigation to determine who can make the best plane, taking careful measurements and drawing conclusions about how streamlined the plane is and how this affects air resistance and therefore distance the plane will travel.	**Success criteria:** By the end of this lesson, children will be able to explain that water resistance is a type of frictional force. They will investigate which shapes have the greatest/least water resistance and write a conclusion.	**Success criteria:** By the end of this lesson, children will be able to describe how mechanisms use a smaller force to have a greater effect. They will be able to identify gears, levers and pulleys and give everyday examples for each.

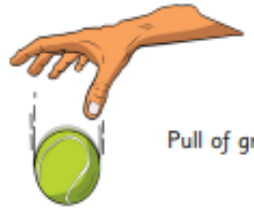
Forces Knowledge Organiser

Forces

A force is a push or pull that **acts upon an object**. **We can't see forces**, but they are an important part of our everyday lives. We **push and pull** objects to do many different things. When we push or pull objects we can **move** the object, **change the shape** of the object **or make the object change direction**.

Gravity

Gravity is a force which **acts at a distance**. It is a **pull force** that pulls objects towards the centre of the Earth.



Pull of gravity

The planets and the Sun do not touch, yet the **planets stay in orbit** around the Sun due to the force of gravity.

Examples of Pushes and Pulls

Push

Pull

Did you know?

Sir Isaac Newton was a **scientist who developed the first description of the force of gravity**. Newton said that he started thinking about **gravity** after watching an **apple fall from a tree** but it did not actually hit him on the head, as it is often claimed!

Friction

Friction is a **force created between two surfaces when they rub together**. Friction creates heat and always **slows down an object**. Rough surfaces create more friction than smooth surfaces.

Air Resistance

Air resistance is a force that acts i**n the opposite direction to gravity**. **It acts between** a moving object and the air molecules around it, slowing the object down. Air resistance is a type of **friction**. **Parachutes** are used to increase air resistance and slow down the parachutist, so they can land safely. Modern cars and planes are **streamlined in design** to reduce air resistance, allowing them to move faster.

Key Vocabulary

Attract - to pull towards

Contact - when objects touch

Distance - the length between two objects

Force - a push or pull that acts upon an object that can cause it to move, change shape or change direction

Friction - the force that acts upon one surface when it moves against another

Gravity - a pull force that acts at a distance

Pull - to move something towards

Push - to move something away

Repel - to push away

Resistance - an opposing or slowing force

Water Resistance

Water resistance is the force responsible for making it difficult for us to **move through the water**. It acts between a moving object and the **water molecules** around it, **slowing the object down**.

Y5 Forces and Magnets end of topic test

1. What does **gravity** do?

2. True or false - gravity is **a contact force.**

3. Astronauts travel to **the Moon** in a spacecraft. **Rocket engines** push the spacecraft away from the **Earth.** What is the name of the force that tries to pull the spacecraft back **towards Earth?**

4. Did **Sir Isaac Newton** invent gravity?

5. Match the ***force*** to the **correct description.**

air resistance	A force between two surfaces that are sliding, or trying to slide, across each other.
water resistance	A force that acts against gravity to slow falling objects down.
friction	A type of friction that slows us down in water. Also called drag

6. John wants to plan **an investigation** to see who can make the best parachute in Y5. **The best parachute** would create the most air resistance.

a) How would John be able to identify the best parachute by how much air resistance had been created?

The parachute would take the longest amount of time to fall. ☐

The parachute would take the shortest amount of time to fall. ☐

b) Explain your answer.

_____

_____

_____

c) List 2 variables John would have to keep the same to make it a fair test.

_____

_____

_____

7. What is the name of the piece of **equipment** used for **measuring force?**

_____

8. How does the shape of this penguin help it to move through water better?

_____

_____

Year 6

Y6 LIVING THINGS AND THEIR HABITATS (BIOLOGY)

Key Question: What is classification?

Book Hooks:

The Invisible World of Germs – Isabel Thomas
Beetle Boy – M G Leonard

Overview of Learning

Pupils will build on their learning about grouping living things in year 4 by looking at the classification system in more detail. They will be introduced to the idea that broad groupings, such as micro-organisms, plants and animals can be subdivided. Through direct observations where possible, they will classify animals into commonly found invertebrates (such as insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals). They will discuss reasons why living things are placed in one group and not another. They will learn to use a classification key and create their own key using yes/no questions.

Knowledge and Understanding Objectives

Pupils should be taught to:

- describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals;
- give reasons for classifying plants and animals based on specific characteristics.

Key Vocabulary to Explain

classify – to arrange a group of people or things in classes or categories according to shared qualities or characteristics
vertebrate – an animal that has a backbone
invertebrate – an animal without a backbone
exoskeleton – a rigid external covering for the body in some invertebrate animals
vascular – plants that use roots and stems to take in water and nutrients
non-vascular – plants that do not use roots and stems to take in water and nutrients
taxonomy – the scientific process of grouping or classifying living organisms Also explain the terms; herbivore, carnivore, omnivore; the five main animal classification groups (mammals, birds, fish, reptiles and amphibians) and the five main microorganism groups (bacteria, viruses, protozoa, algae and fungi).

Assessment

Working Scientifically Objectives

- record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs;
- report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations;
- identify scientific evidence that has been used to support or refute ideas or arguments.

Previous Learning

Y1,2,3 and 4 – identify and name a variety of common plants; identify and describe the basic structure of a variety of common plants, including trees; compare the differences between things that are living, dead, and things that have never been alive; most living things live in habitats to which they are suited; different habitats provide for the basic needs of different kinds of animals and plants; create and use a simple food chain; identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers; explore requirements for life and growth and how they vary from plant to plant; investigate the way in which water is transported within plants; explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal; recognise that living things can be grouped in a variety of ways; explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment; recognise that environments can change and that this can sometimes pose dangers to living things.

Future Learning

KS3 – study cell structure and organisation and learn relationships within an ecosystem.

Stretch and Challenge Across the Curriculum

Find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification. Use classification systems and keys to identify some animals and plants in the immediate environment. Research unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system. Use classification systems and keys to identify some organisms in the immediate environment. Record these in a variety of ways (e.g., Venn and Carroll diagrams, tables). Choose 4 different local micro-habitats to investigate. Predict and observe which types of invertebrates might be found in each micro-habitat, using an arthropod identification key provided. **Record results in a table** and then **transfer their results to a bar chart.** Discuss which micro-habitat is most diverse in terms of invertebrate population.

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Key question: How are animals classified?	**Key question:** What is a classification key?	**Key question:** How can we classify plants?	**Key question:** Is yeast a living microorganism?	**Key question:** What are the five main groups of microorganisms?	**Key question:** Who was Carolus Linnaeus?
Learning objective: I can describe how living things can be classified into broad groups.	**Learning objective:** I understand how I can use classification keys to help group, identify and name a variety of living things.	**Learning objective:** I can describe how living things can be classified into broad groups.	**Learning objective:** I understand that microorganisms are also living things.	**Learning objective:** I can describe how living things can be classified into broad groups.	**Learning objective:** I know that scientists have developed different ways to classify living things
Success criteria: By the end of this lesson, children will be able to sort animals into groups using different criteria; e.g. nutrition (omnivore, carnivore or herbivore; animal group (fish, amphibian etc); Vertebrate/invertebrate.	**Success criteria:** By the end of this lesson, children will be able to use a classification key to identify animals and create a key using yes/no questions to identify animals.	**Success criteria:** By the end of this lesson, children will be able to select criteria to use to sort plants into groups. They will be able to use the internet to research information about plants and sort them into groups based on their characteristics.	**Success criteria:** By the end of this lesson, children will to able to explain that microorganisms are living things and will have conducted an experiment to prove that yeast respires and is therefore a living microorganism.	**Success criteria:** By the end of this lesson, children will be able to name the five main groups scientist use to classify microorganisms. They will be able to give examples of some of the characteristics and features of each group.	**Success criteria:** By the end of this lesson, children will be able to explain who Carolus Linnaeus was and why he is an important scientist. In groups, they will create a presentation about his life and work.

Living Things & their Habitats

Grouping Animals

We can group animals into different groups based on their characteristics.

fish, mammals, reptiles, amphibians, birds

We can also group animals based on their diet.

omnivores, herbivores, carnivores

We can also group animals based on their bone structure.

vertebrates and invertebrates

Grouping Microorganisms

Microorganisms are **very small** living things. We can classify microorganisms into **five groups**.

viruses, bacteria, fungi, algae, protozoa

Grouping Plants

We can group plants based on how they disperse their seeds.

wind, explosion, animals, water

We can group plants on whether they grow a flower.

flowering or non-flowering

Linnaeus Classification

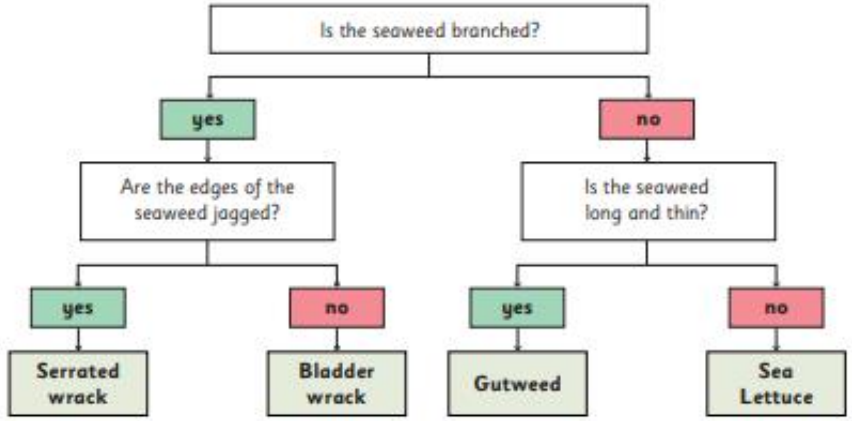
Carolus Linnaeus (also known as Carl Linnaeus) was a scientist who developed a detailed way to **classify** all living things known as a **taxonomy**.

His taxonomy helps us to determine what each living thing is. His scientific process involved **observing**, **recording** the information and making **conclusions**.

Classification Keys

Classification keys usually have statements or questions that describe some of the **features** or **characteristics**. You have to answer either **yes** or **no**. Your answer will then take you to another **question** or **statement** OR the **type of living thing**.

This one looks at the **physical appearance** of **seaweed**.



Seaweed **A** is

Seaweed **B** is

Seaweed **C** is

Seaweed **D** is

Key Vocabulary

amphibians - an animal that is born in the water but develops lungs and lives on land later in its life
birds - a type of animal that has wings and is born from a hard-shelled egg
carnivore - a living things that just eats meat
characteristic - a feature or quality
classification - to categorise or group something
excretion - to dispose of waste
fish - a type of animal that lives in water and has scales, gills and fins
group - sorting things based on their similarities
growth - to get bigger
herbivore - a living thing that just eats plants
invertebrate - an animal that does not have a backbone
mammals - a type of animal that has hair on its body and usually drinks milk from its mother as a baby
movement - to change position
nutrition - the food we eat
omnivore - a living thing that eats both plants and meat
reproduce - to create more of the same species
reptiles - a type of animal that is cold-blooded and has scaly skin
respiration - taking in gas and giving out another (breathing in humans)
sensitivity - using your senses (see, smell, hear, touch, taste)
taxonomy - the scientific study of naming, defining and classifying groups of organisms based on shared characteristics
vertebrate - an animal with a backbone

Y6 Living Things & their Habitats
End of Topic Test

1. What does **classify** mean?

_____

2. Sort these animals into the **different groups**.

keywords
penguin shark human elephant clownfish lizard toad frog snake eagle

Mammal	Reptile	Fish	Amphibian	Bird

3. Give another **example** of how we could **group** these animals.

_____

_____

4. What is a **micro-organism**?

_____

5. Which of the following are **types** of micro-organism? **Circle five**.

mammal	algae	carnivore	bacteria
virus	amphibian	seed	protozoa
flowering	vascular	fungi	omnivore

6. Some children find four **minibeasts**. They make a table about their **observations**. Complete the table below by adding the **names** of these four minibeasts.

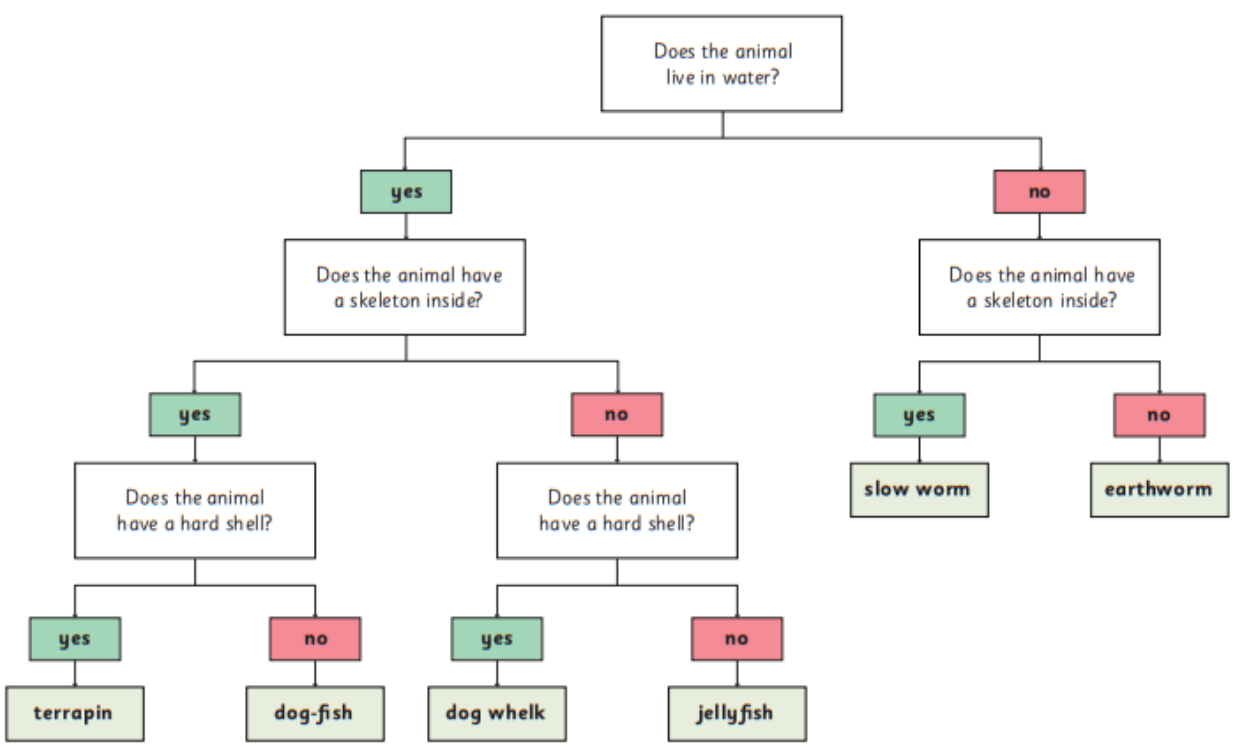
Name	Legs	Wings	Antennae
	6	4	2
	6	2	2
	6	0	2
	8	0	0




7. It is important for scientists to **classify** animals into groups. Tick **ONE box** to show the best reason for **classifying** animals.

- ☐ to compare the many types of animal
- ☐ to find out which animals live in trees
- ☐ to find out which animals eat them
- ☐ to help find animals in the wild

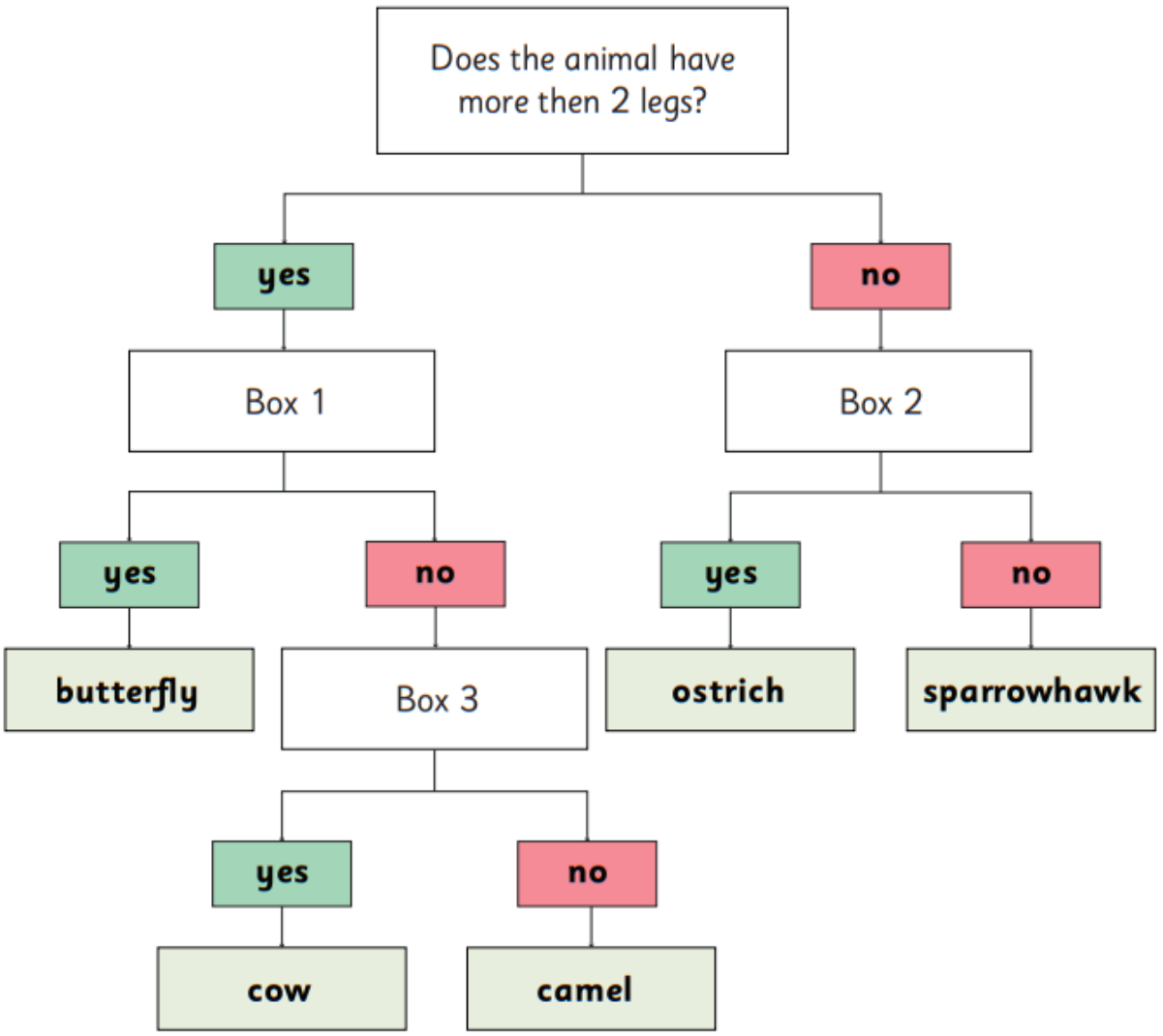
8. The **key** below can be used to **identify** some animals.



Use **the information** in the key to help you **circle** the animals in the box below that **do not have a skeleton** inside their bodies. Circle all the **correct answers**.

terrapin	**dogfish**	**dog whelk**
jellyfish	**slow worm**	**earthworm**

9. Mandy and Halim **sort** the animals using the **key** below.



Question	The question goes in box...
Does it have a long neck?	**1** **3**
Does it have horns?	**1** **2**
Does it have antennae?	**2** **3**

Y6 ANIMALS INCLUDING HUMANS (BIOLOGY)

Key Question: How do an animal's living systems work together to maintain a healthy body?

Book Hooks:

Pig Heart Boy – Malorie Blackman

Overview of Learning

Pupils will build on their learning from years 3 and 4 about the main body parts and internal organs (skeletal, muscular and digestive system) to explore and answer questions that help them to understand how the circulatory system enables the body to function. They will learn about how the circulatory system transports oxygen around our body. They will learn about the heart and how it is an important muscle in our bodies. They will learn about their heart rate and different activities that can increase the heart rate. Pupils will learn how to keep their bodies healthy and how their bodies might be damaged – including how some drugs and other substances can be harmful to the human body.

Knowledge and Understanding Objectives

Pupils should be taught to:

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

Key Vocabulary to Explain

heart – a muscle that pumps blood around the body
lungs – spongy air-filled organs that provide oxygen to the blood
blood – a liquid that carries oxygen, water and nutrients around the body
veins – carry deoxygenated blood to the heart
arteries – carry oxygenated blood away from the heart
heart rate – the number of times our heart beats per minute

Stretch and Challenge Across the Curriculum

Explore the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health. Research the gestation periods of other animal; record the length and mass of a baby as it grows. Make their own model of the human circulatory system. Research to see if all animals have the same circulatory system as humans. Make a working lung model using a plastic bottle and balloons. Describe the functions of red blood cells, white blood cells, platelets and plasma, and create a pie chart showing the percentage of each component by volume in a typical sample of blood. Create an information text on the human circulatory system using what they have learned. Take and record their resting heart rate, **record their results in a table** and **transfer them to a line graph**.

Working Scientifically Objectives

- plan different types of scientific enquiries to answer questions, including recognising, and controlling variables where necessary;
- take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate;
- record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs;
- use test results to make predictions to set up further comparative and fair tests;
- report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations;
- identify scientific evidence that has been used to support or refute ideas or arguments.

Previous Learning

- **Y3 and 4** - identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat; identify that humans and some other animals have skeletons and muscles for support, protection and movement; describe the simple functions of the basic parts of the digestive system in humans; identify the different types of teeth in humans and their simple functions; construct and interpret a variety of food chains, identifying producers, predators and prey.

Future Learning

KS3 – the importance of a healthy diet and how different foods are absorbed and used in the human body; gas exchange systems in the lungs of the human body; look at the effects of recreational drugs including substance misuse.

Assessment

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Key question: What is the circulatory system?	**Key question:** How does our heart work?	**Key question:** How does exercise affect my heart rate?	**Key question:** What does the blood transport around the body?	**Key question:** How can I live a healthy lifestyle?	**Key question:** What can damage our health?
Learning objective: I can identify and name the main parts of the human circulatory system.	**Learning objective:** I can identify and name the main parts of the heart.	**Learning objective:** I can investigate which activity increases my heart rate the most.	**Learning objective:** I can describe how water and nutrients are transported in humans.	**Learning objective:** I can identify how humans can live a healthy lifestyle.	**Learning objective:** I can identify how humans can live a healthy lifestyle.
Success criteria: By the end of this lesson, children will be able to name the main parts of the human circulatory system and explain how the system works.	**Success criteria:** By the end of this lesson, children will be able to name the main parts of the heart and explain how the heart pumps blood.	**Success criteria:** By the end of this lesson, children will be able to find their pulse, calculate their heart rate and investigate different activities to see which increases the heart rate.	**Success criteria:** By the end of this lesson, children will be able to explain how the blood plays a role in transporting nutrients and water around the body.	**Success criteria:** By the end of this lesson, children will be able to describe how we can keep healthy by exercising, eating a healthy diet and taking care of our hygiene.	**Success criteria:** By the end of this lesson, children will be able to identify different things that people do that can lead to them being unhealthy.

The Circulatory System Knowledge Organiser

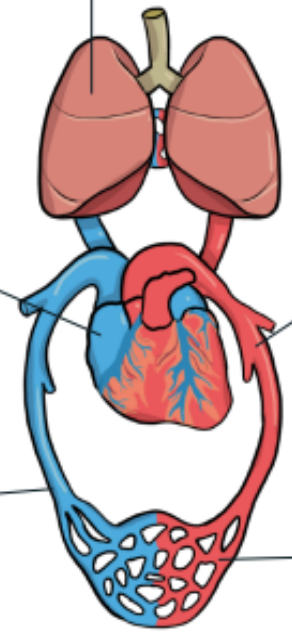
The body's **circulatory system** is responsible for transporting nutrients, water and oxygen to the billions of cells all around your body. It also carries away **waste**, such as **carbon dioxide**, that the cells produce. It is an amazing system that travels through your entire body connecting all your body cells.

The Human Circulatory System

The lungs provide the blood with **oxygen**.

The heart pumps **deoxygenated blood** to the lungs.

The heart pumps oxygenated blood through blood vessels called **arteries**.



Deoxygenated blood and nutrients travel back to the heart through blood vessels called **veins**.

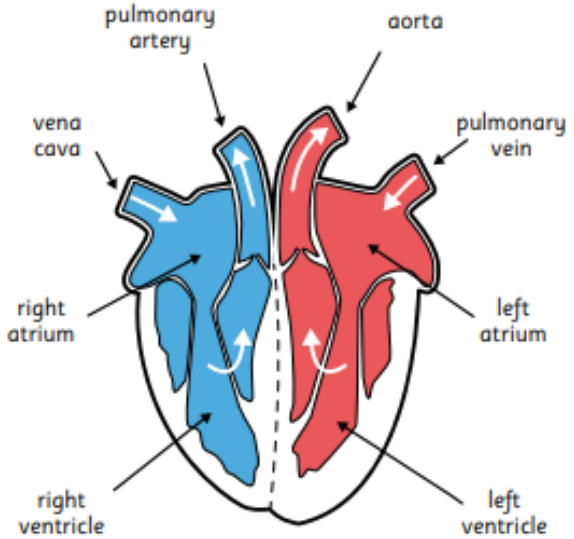
The blood travels to all other body parts, delivering oxygen, water and nutrients.

Health Heroes and Villains

You can keep your body healthy by eating a balanced diet, ensuring you have good hygiene and exercising regularly.

You should avoid eating lots of unhealthy food, smoking, drinking alcohol and becoming inactive.

The Human Heart



Key vocabulary

absorb - take in or soak up

aorta - the main artery in the human circulatory system

arteries - the tubes that carry oxygenated blood around the body

atriums - the upper chambers of the heart

blood vessels - the tubes that carry blood around the body (veins, arteries and capillaries)

deoxygenated - refers to blood that is not carrying oxygen

nutrients - a substance that provides nourishment essential for the maintenance of life and for growth

oxygenated - refers to blood that is carrying oxygen

pulse - the beat of your heart

veins - the tubes that carry deoxygenated blood back to the heart

vena cava - a large vein that carries deoxygenated blood into the heart

ventricles - the main chambers of the heart

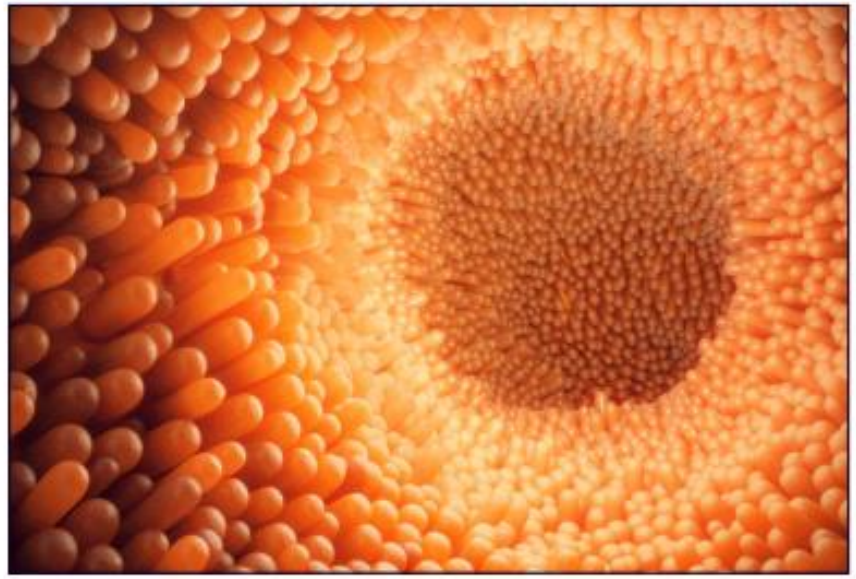
villi - finger-like structures that line the small intestine to absorb water and nutrients

Absorbing Water and Nutrients

We absorb water and nutrients through the food we eat.
The **small intestine** is lined with villi.
Villi have veins and arteries running through them.

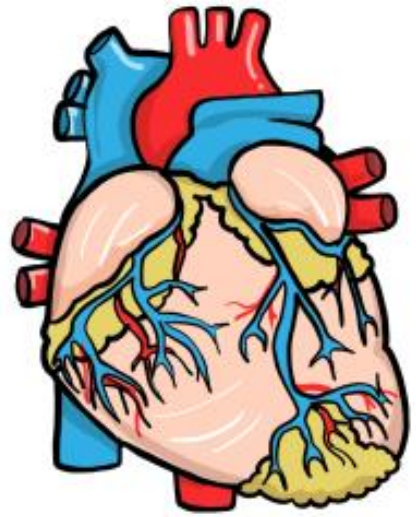
The blood in the arteries delivers **oxygen** to the intestine.
Nutrients are absorbed into the blood, which are then taken away to other parts of the body.

Water is also absorbed in this way. The blood carries the water and nutrients to the parts of the body that need it.



Did you know?

- The heart pumps all the time. It pumps more than **2.5 billion times** over an average lifetime.
- If you were to lay out all of the **blood vessels** in one adult, end-to-end, they would stretch about **60,000 miles**. It's only 9500 miles from London to Australia!
- We have to exercise our heart to keep it strong. Doctors advise at least **30 minutes of activity** a day that gets your heart rate up!
- An average-sized adult carries about **5 litres of blood**.



End of topic test

1. This photo shows a boy measuring his pulse. What does a pulse rate measure?

2. Some children are learning about blood and how it flows around the human body. Blood flows faster when the heart pumps faster. Which TWO of the following make the heart pump fastest?

- ☐ running
- ☐ skipping
- ☐ sleeping
- ☐ sitting

3. Children's hearts beat faster as they ran around the playground.
Explain why this happens when they run.

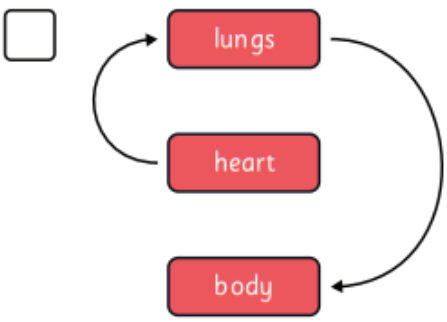
4. What is the heart made from?

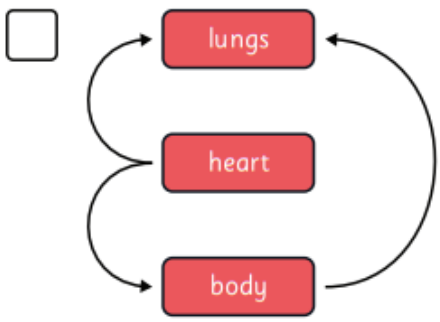
5. What is the difference between a vein and an artery?

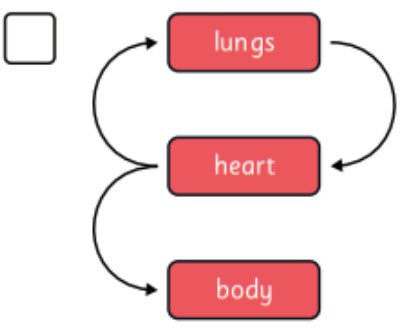
End of topic test

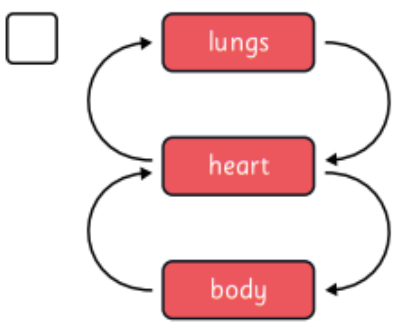
6. What is the role of the blood in the circulatory system?

7. The heart pumps the blood. Which diagram best shows the path of the blood as it circulates? **Tick ONE box**.









8. Year 6 is learning about the harmful effects of smoking. They read the warning on a packet of cigarettes. How can smoking affect your lungs?

End of topic test

9. How can you lead a healthy lifestyle?

10. How does the digestive system help with the absorption of nutrients and water?

Y6 EVOLUTION AND INHERITANCE (BIOLOGY)

Key Question: What is evolution?

Book Hooks:

One Smart Fish by Christopher Wormell
The Misadventures of Charles Darwin by Isabel Thomas

Overview of Learning

Pupils will build on what they learned about fossils in the topic on rocks in year 3, pupils will find out more about how living things on earth have changed over time. They will be introduced to the idea that characteristics are passed from parents to their offspring. They will explore how animals and plants are adapted to the environment in which they live. They will learn that adaptations occur over time and that may lead to a species evolving. They will consider how certain adaptations occur in response to environmental conditions. They will learn about natural selection and how this links to inheritance and how some characteristics are inherited from parents, and some are not. They will consolidate previous learning on fossilisation and understand how studying fossils has helped explain the theory of evolution.

Knowledge and Understanding Objectives

Pupils should be taught to:

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

Key Vocabulary to Explain

Adaptation: When a plant or animal has changed in some way, usually over a long period of time, to be better suited to the environment in which they live.
Environment: the conditions that surround an organism.
Evolution: the process by which different kinds of living organisms are believed to have developed from earlier forms during the history of the Earth.
Gene: A unit of heredity which is transferred from a parent to offspring and is held to determine some characteristics of the offspring.
Natural selection: When the fittest, most adapted organisms survive and multiply whilst the least adapted die out.
Inheritance: the reception of genetic qualities by transmission from parent to offspring.
Organism: an individual animal, plant or single-celled life form.
Species: a group of similar organisms that are able to reproduce.

Working Scientifically Objectives

- plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary;
- take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.

Previous Learning

Y2 - 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;
Y3 - the Earth is made up of different rocks and fossils and begin to explain how some of the different rocks are formed. Look at fossils, what they are and how they are formed in rock.

Future Learning

KS3 – inheritance, chromosomes, DNA and genes; heredity is the process by which genetic information is transmitted from one generation to the next and that there are differences between species; there is variation between species and between individuals of the same species, which means some organisms compete more successfully, which can drive natural selection. 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.

Stretch and Challenge Across the Curriculum

Find out about the work of paleontologists such as Mary Anning and about how Charles Darwin and Alfred Wallace developed their ideas on evolution. Consider how fossils help us to understand evolution. Write an explanation. Complete a table matching the type of teeth an animal has to its diet. Explain how the shape of the teeth helps the animal feed. Compare two different butterflies from a drawing provided. Consider the traits of the butterflies and predict what the offspring would look like.

Assessment

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Key question: How are plants adapted to their environment?	**Key question:** How are animals adapted to their environment?	**Key question:** What is natural selection and how does this lead to evolution?	**Key question:** How do adaptations lead to evolution?	**Key question:** What characteristics can you inherit from your parents?	**Key question:** How can fossils help us explain evolution?
Learning objective: I can identify how plants are adapted to their environment.	**Learning objective:** I can identify how animals are adapted to their environment	**Learning objective:** I can explain natural selection and how it may lead to evolution.	**Learning objective:** I can explain natural selection and how it may lead to evolution.	**Learning objective:** I can recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.	**Learning objective:** I can recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.
Success criteria: By the end of this lesson, children will be able to explain what adaptation is. They will be able to explain how cacti are adapted to live in hot/dry conditions. Some children will also be able to explain the features and adaptations of other plants.	**Success criteria:** By the end of this lesson, children will explain how their chosen animal is adapted to its environment.	**Success criteria:** By the end of this lesson, children will be able to explain what natural selection is using the peppered moth as an example. They will understand how adaptation and natural selection lead to species changing (evolving) over time in order to survive.	**Success criteria:** By the end of this lesson, children will be able to explain how adaptations lead to evolution. They will plan and investigate to answer the question: - Which beak is better adapted to pick up each seed?	**Success criteria:** By the end of this lesson, children will be able to explain that genetic traits are passed on from parents to offspring. They will be able to list characteristics that are possible to inherit and characteristics that aren't.	**Success criteria:** By the end of this lesson, children will be able to explain how fossils tell us about evolution.

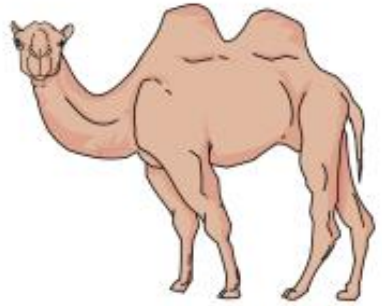
Evolution

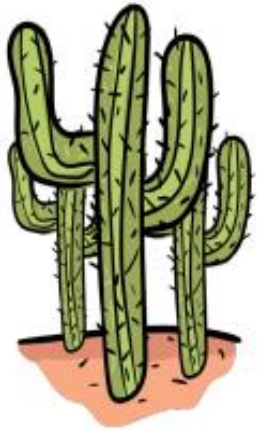
Adaptation

Adaptation is when a plant or animal has changed in some way, over a long period of time, to be better suited to the environment in which it lives.

Camels have long **eyelashes** to **protect** their eyes from the sand.

They also **have large, wide, flat feet** to help them **walk on the sand** without sinking.





Cacti grow in the desert which is hot and sandy.

- They have spines instead of leaves to protect them from being eaten by predators.
- They have a thick, waxy skin which helps reduce the amount of water they lose.
- They have shallow, widespread roots which allow fast absorption of water when it rains.
- They have large, thick stems which allow them to store water until they need it.

Inheritance

When parents have **offspring,** they pass on their **physical traits.** The offspring inherit their parents' **qualities.** This means that most **offspring look like their parents** but they are not identical. The offspring may take characteristics from the father, the mother or a mixture of both.

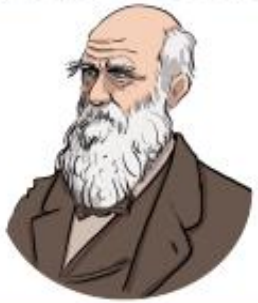
Traits you can inherit	Traits you can't inherit
eye/hair/skin colour, shape of nose, size of feet, height	a good singing voice, ability to play football, drawing skills

The Beckham Family

The children have inherited certain traits from their parents but they cannot inherit Victoria's singing ability or David's football skills.

Super Scientist!

Charles Darwin was an **English Naturalist** born on **February 12, 1809** in Shrewsbury, England. He is best known for developing a **theory of evolution** to explain biological change. He went on a voyage to **study animals** on the **Galapagos Islands.** On his voyage, Darwin **studied tortoises.** He noticed that each island had a different species of tortoise. He also studied **finches.** Each island had a **different species** of finch. He **wrote many books about his voyage**, Journal of Researches, Coral Reefs, Volcanic Islands and Geographical Observations on South America.



Natural Selection

Natural selection is when organisms that are best suited to their **environment** survive and pass on their **genetic traits.** At the same time, **organisms** that are less likely to survive tend to be eliminated from the **ecosystem.** The fittest, most adapted organisms survive and multiply whilst the least adapted die out.

This was shown with the peppered moths. The light coloured moths were no longer adapted to their environment so started to die out. Whilst dark coloured moths were adapted to the environment so multiplied.

Natural selection is key to explaining evolution. Evolution is a theory that states that all species that exist today developed from previous species. For example, some scientists believe that humans evolved from apes!

Key Vocabulary

Adaptation - the process of changing.
Characteristics - a feature or quality belonging typically to a person, place, or thing and serving to identify them.
DNA - carries specific genetic information inside every living thing.
Ecosystem - a physical environment where things live.
Environment - the surroundings in which a person, animal or plant lives.
Evolution - a theory that states that all species that exist today developed from previous species.
Genetics - inherited characteristics.
Inherit - to pass on something.
Inheritance - something that has been passed on.
Natural Selection - when organisms that are best suited to their environment survive and pass on their genetic traits.
Organism - living things.
Trait - a feature or quality belonging typically to a person, place, or thing and serving to identify them.

Y6 Evolution and Inheritance
End of topic test

Name: _____ Class: _____

Date: _____ Score: _____

1. Explain the meaning of these words.

evolution

_____

_____

inheritance

_____

_____

adaptation

_____

_____

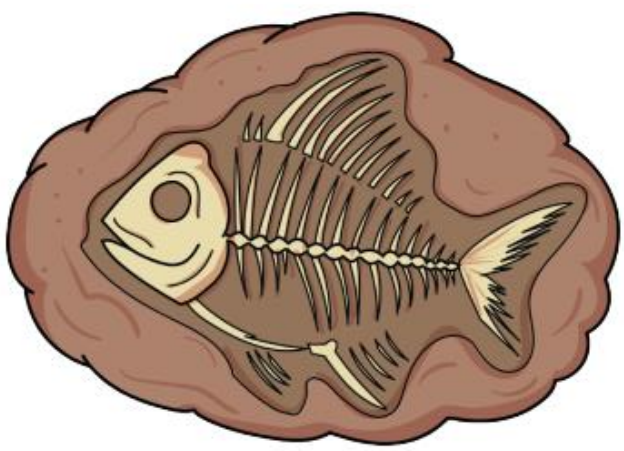
2. A cactus has many adaptations so that it is suited to its environment.
Match the adaptation to the correct explanation.

thick waxy skin	This adaptation helps to absorb water quickly when it rains.
large stems	This adaptation protects them from predators.
shallow, widespread roots	This adaptation allows the cactus to store water until it needs it.
spines instead of leaves	This adaptation helps to reduce water loss.

3. Camels can live in hot places. Some features of a camel's body help it to survive in a hot desert. Match each feature below to show how it helps the camel survive in the desert.

Camel's features	How feature helps
long legs	keep the camel's body further from the hot sand
wide feet	protect camels when eating prickly plants
thick fur	help camels stay on top of the sand
long eyelashes	protect camels against sand blowing in the air
thick, leathery lips	protects camels from getting sunburnt

4. The picture shows the fossil of a pliosaur. These animals lived in the sea a long time ago.



What material are fossils made of?

_____

_____

5. Fossils can give a lot of information about animals that lived in the past.
Write true or false for each statement about the pliosaur fossil.
The pliosaur's fossil could give us information about...

	True	False
how long ago the animal lived.	☐	☐
what the animal ate.	☐	☐
what the animal smelt like.	☐	☐
what colour the animal's eyes were.	☐	☐
how large the animal was.	☐	☐

6. How can fossils help support the theory of evolution?

7. There are 2 ducks in a pond.

Describe how a duck's feet are adapted for swimming.

8. Peter sees some piles of soil on the grass near the pond. Grandad tells him that piles of soil are made by animals called moles. Look at the picture of a mole.

Describe how a feature of the mole helps the mole to live underground.

Feature:	**How it helps:**

9. Name two characteristics that you could inherit from your parents.

10. Name two characteristics that you cannot inherit from your parents.

Y6 LIGHT (PHYSICS)

Key Question: What is light?

Book Hooks:

Goodnight Mr Tom by Michelle Magorian
Letters from the Lighthouse by Emma Carroll

Overview of Learning

Pupils will build on the work on light in year 3, exploring the way that light behaves, including light sources, reflection and shadows. They will talk about what happens and make predictions and understand how the eye works.

Knowledge and Understanding Objectives

Pupils should be taught to:

- recognise that light appears to travel in straight lines;
- use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye;
- explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes;
- use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

Key Vocabulary to Explain

dark – the absence of light
reflect – a surface (or body) that throws back light without absorbing it
shadow – an area where direct light from a light source cannot reach due to obstruction by an object
opaque – opaque materials do not let any light pass through them. They block the light.
translucent – translucent materials let some light through but scatter the light in all directions so that they cannot see clearly through them
transparent – transparent materials let light pass through them in straight lines so that you can see clearly through them
luminous – giving off light, bright or shining
scattering – when light is returned from a surface
absorption – when light strikes a surface and is retained within it.
refraction – the "bending" of light when it passes from one transparent material to another.

Working Scientifically Objectives

- use test results to make predictions to set up further comparative and fair tests;
- plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary;
- take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate;
- record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs;
- report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.

Previous Learning

Y3 – recognise that they need light to see things and that dark is the absence of light; notice that light is reflected from surfaces; recognise that light from the sun can be dangerous and that there are ways to protect their eyes; recognise that shadows are formed when the light from a light source is blocked by an opaque object; find patterns in the way that the size of shadows change.

Future Learning

KS3 - Human sight is based on the ability to see red, blue and green light and that the colour of an object depends on the colours of light that it absorbs and scatters. Light travels at 300 million metres per second in a vacuum and different colours of light have different frequencies. The path that light takes can be bent (refracted) and that transparent materials can be shaped into lenses and prisms to alter the path of light by refraction (convex and concave lens). The ray model can describe the formation of an image in a mirror and how objects appear different colours.

Stretch and Challenge Across the Curriculum

Design and make a periscope and use the idea that light appears to travel in straight lines to explain how it works. Investigate the relationship between light sources, objects and shadows by using shadow puppets. Look at a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters.

Assessment

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Key question: How does light travel?	**Key question:** Which materials make the best reflectors?	**Key question:** How does the eye work?	**Key question:** How do shadows change during the day?	**Key question:** Why do objects look different in water?	**Key question:** How do mirrors work?
Learning objective: I can recognise that light appears to travel in straight lines.	**Learning objective:** I can 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. I can predict which materials make good reflectors.	**Learning objective:** I can 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. I can explain how the eye works.	**Learning objective:** I can use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. I can explain how shadows change during the day.	**Learning objective:** I can use the idea that light travels in straight lines to explain that we can see objects because they give out or reflect light into the eye.	**Learning objective:** I can 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.
Success criteria: By the end of this lesson, children will be able to identify light sources and draw an annotated, scientific diagram to explain how light travels in straight lines from a light source.	**Success criteria:** By the end of this lesson, children will be able to identify reflective materials and understand how light is reflected. They will be able to predict which materials make good reflectors and discuss the properties of these materials.	**Success criteria:** By the end of this lesson, children will be able to explain how light, from a light source is reflected from an object and enters the eye. They will be able to name/ label parts of the eye (and talk about their functions).	**Success criteria:** By the end of this lesson, children will have planned a fair investigation to answer the question - how do shadows change during the day? They will be able to draw a conclusion using data collected in their investigation.	**Success criteria:** By the end of this lesson, children will be able to explain why objects in water appear to be bent. They will be able to explain the difference between reflection and refraction.	**Success criteria:** By the end of this lesson, children will be able to explain how mirrors reflect light. Through their explorations, they will understand how light behaves when it is reflected. They are able to draw a diagram to show the path of reflected light.

Light Knowledge Organiser

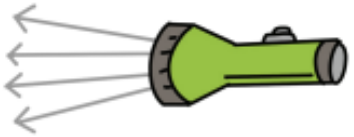
Light sources

A **light source** makes light. The **Sun** and other **stars**, **fires**, **torches** and **lamps** all make their own light, so they are examples of sources of light.



Travelling light

Light travels very fast in **straight lines** called **light rays**. Even though light travels in straight lines, it travels in **different directions**.



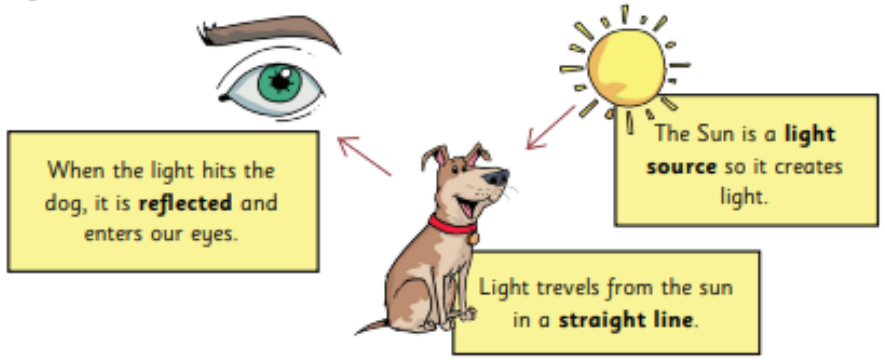
Light rays from a torch travel in different directions but **always in straight lines**.

Reflective light

We can see things because light is **reflected**. Some materials reflect light better than others.

Light travels in straight lines. When light from an object is reflected by a surface, it changes direction.

Smooth, **shiny surfaces** such as mirrors and polished metals **reflect light well**. **Dull** and **dark surfaces** such as dark fabrics do **not reflect light well**.

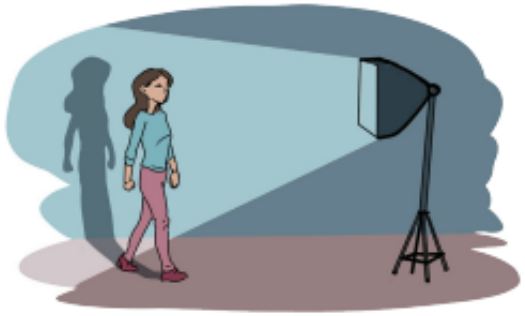


When light hits an object, it is **reflected** (bounces off) and enters our eyes. This is how we see the object.

We need **light sources** to be able to see; otherwise, there is no light to reflect off surfaces and into our eyes. This is why we cannot see in the dark.

Shadows

A **shadow** is made when an **object blocks light**. A shadow is a **dark area** or **shape** caused by a solid object blocking the rays of light from a light source.



Refraction

Light doesn't always travel in straight lines like it wants to; it can **change direction**.

Light rays change speed when they pass across the boundary between two states of matter, such as gas and liquid. This causes them to **change direction**, and this effect is called **refraction**.

An example of refraction is a straw in a glass of water.

Key Vocabulary

dark - the absence of light

direction - the way that something is moving

light - a source of energy that allows you to see

light ray - an imaginary line that represents the line of light

light beam - a group of light rays

light source - something that makes light

opaque - cannot see through

reflect - bounces off or changes direction

reflective - something that reflects well

refraction - when light changes direction when going through the boundary of a state of matter

see - to perceive with the eyes

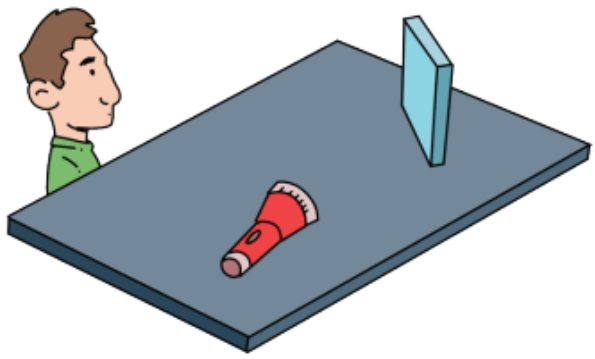
shadow - a dark area or shape produced by an object coming between rays of light and a surface

transparent - can see through

translucent - can see through partially, but not in detail

Y6 Light End of Topic Test

1. The picture below shows Liam looking at the torchlight reflected in a mirror. Draw TWO arrows to show the direction the light must travel for Liam to see the light from the torch in the mirror.



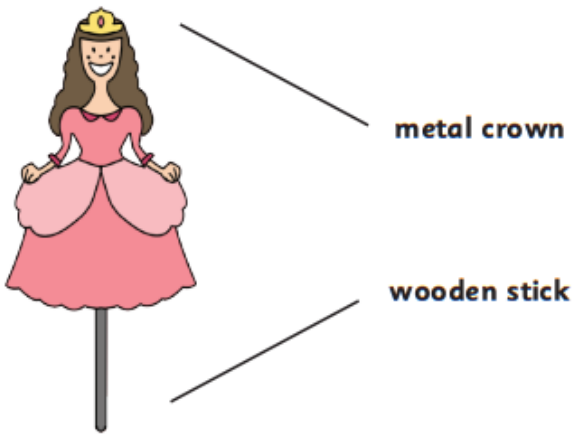
2. Match the eye part to its description:

Eye Part	Description
	The white part of the eye. Six tiny muscles are attached to it to control the eye's movements.
	Sends signals representing colour, light and dark from the eye to the brain.
	Contains millions of photoreceptors that convert light into electric impulses ready to send to the brain.
	Transparent coating that covers the iris and the pupil. Helps the eye to focus.
	Coloured part of the eye which controls the amount of light that enters the eye.
	Focuses light onto the back of the eye.
	Light enters the eye here.

Key words:

iris, lens, sclera, pupil, retina, optic nerve, cornea

3. Emma makes a stick puppet. She draws a face on it. The puppet has a metal crown. When Emma shines a light on the puppet, the crown looks shiny.



Why does the metal crown look shiny when the light is on it?

_____

_____

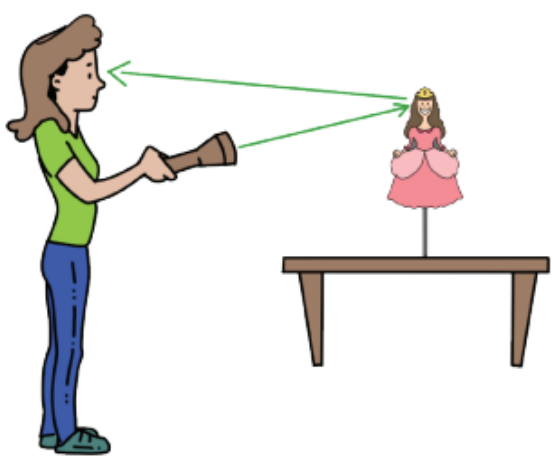
4. Explain what is happening in this picture that allows Emma to see her puppet.

_____

_____

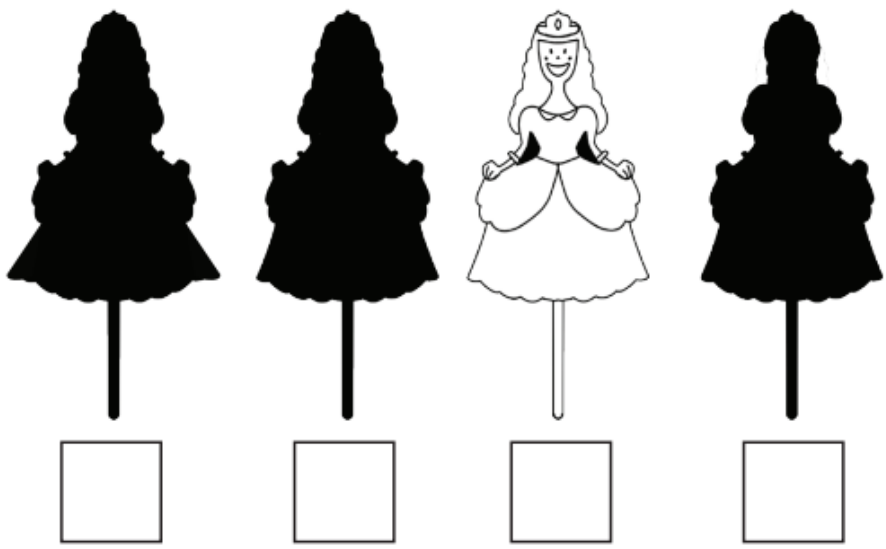
_____

_____



5. When the light shines on the puppet, Emma can see a shadow of the puppet on the wall behind. Why does a shadow form behind the puppet when the light shines on it?

6. Which of the following shows the correct shadow of Emma's puppet? Tick **ONE** box.



7. Define these words:

reflect

refract

Y6 ELECTRICITY (PHYSICS)

Key Question: What is electricity?

Book Hooks:

The Boy Who Harnessed the Wind by William Kamkwamba
Percy Jackson and The Lightning Thief by Rick Riordan

Overview of Learning

Building on their work in year 4, pupils will construct simple series circuits, to help them to answer questions about what happens when they try different components, for example, switches, bulbs, buzzers and motors.

Knowledge and Understanding Objectives

Pupils should be taught to:

- associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit;
- compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches;
- use recognised symbols when representing a simple circuit in a diagram.

Key Vocabulary to Explain

appliance – a device or piece of equipment that has been made to perform a specific task
battery – a small item used to power small appliances
circuit – a route through which electricity flows
components – the parts of a circuit
conductor – allows electricity to flow through it
electrical – something that uses electricity to work
insulator – doesn't allow electricity to flow through it
mains power – electricity provided by power stations
pylon – a tower used for keeping electrical wires above the ground
renewable energy – energy from a source that is not depleted when used, such as wind or solar power
non-renewable energy – energy from a source that is depleted when used, such as coal, gas and oil

Stretch and Challenge Across the Curriculum

Design and make a set of traffic lights, a burglar alarm or some other useful circuit. Use the internet to research information about renewable and non-renewable energy sources and communicate this information in the form of a leaflet. Give verbal / written scientific explanations for unexpected observations or measurements, making allowances for anomalies. Research Nikola Tesla / Alessandro Volta.

Working Scientifically Objectives

- plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary;
- take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate;
- record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter, bar and line graphs;
- use test results to make predictions to set up further comparative and fair tests;
- report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations;
- identify scientific evidence that has been used to support or refute ideas or arguments.

Previous Learning

Year 4 - 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 a lamp will light in a simple series circuit, based on whether 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 a lamp lights in a simple series circuit; recognise some common conductors and insulators, and associate metals with being good conductors.

Future Learning

KS3– Current and static electricity, parallel and series circuits; current is measured and work out potential differences; calculate differences in resistance between conducting and insulating components (quantitative).

Assessment

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5
Key question: How do I draw a scientific diagram of a circuit?	**Key question:** How does voltage in a circuit affect the brightness of a bulb?	**Key question:** How do I plan a fair test experiment to investigate variations in how components function?	**Key question:** How do I write a conclusion for my investigation?	**Key question:** What is renewable and non-renewable energy?
Learning objective: I can use symbols when drawing a simple circuit diagram	**Learning objective:** I can associate the brightness of a lamp with the number and voltage of cells used in the circuit.	**Learning objective:** I can investigate variations in how components function.	**Learning objective:** I can investigate variations in how components function and write a conclusion.	**Learning objective:** I can name renewable and non-renewable sources of energy.
Success criteria: By the end of this lesson, children will be able to construct and draw a variety of circuits using scientific symbols to represent each component. They will be able to look at a drawing of a circuit and work out if it will work or not.	**Success criteria:** By the end of this lesson, children will have conducted an investigation to discover the effect that increasing the voltage in a circuit has on the brightness of a bulb. They will be able to describe this relationship and draw conclusions.	**Success criteria:** By the end of this lesson, children will be able to plan and conduct a fair test investigation to determine variations in how components function in a circuit.	**Success criteria:** By the end of this lesson, children will be able to write a clear conclusion using the data collected in their investigation.	**Success criteria:** By the end of this lesson, children will have produced a leaflet to explain renewable and non-renewable energy.

Electricity Knowledge Organiser

Electrical Appliances



Most big appliances in our house have to be **plugged in**. Theseare powered by **mains power**. Some smaller appliances can bepowered by **batteries**. Some appliances have batteries that need to be **charged** by mains power.

How is electricity made?

Electricity can be made using a simple **generator**. We could make one in school using a **magnet** and a **coil of wire**. If we turn a magnet around inside a coil of wire, it creates **electricity in** the wire. Doing this only makes a **small amount** of electricity so we need large generators to make enough for everyone. These generators are usually in **power stations**. There are **different types** of power stations.

Non-renewable Mains Power

Most of the electricity in the UK is made using **non-renewable** power stations. These power stations **burn oil**, **coal** or **gas** to create **steam** which turns the generator.
Oil, coal and gas are **fossil fuels**. They are non-renewable which means that they will eventually run out one day. This is because they are naturally occurring and take thousands of years to make. Burning these fossil fuels can also damage **the environment** as they produce gases such as **carbon dioxide** and **methane**.

Renewable Mains Power

We can also make electricity using renewable energy. Renewable energy sources like **the Sun**, **wind** and **sea** can be used over andover again and should not run out. We are beginning to use thesesources more as they do not damage our environment.

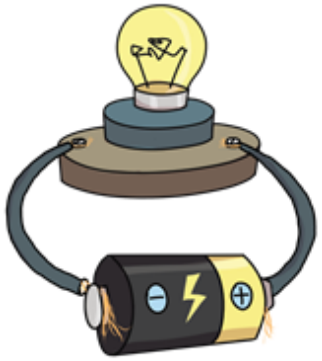


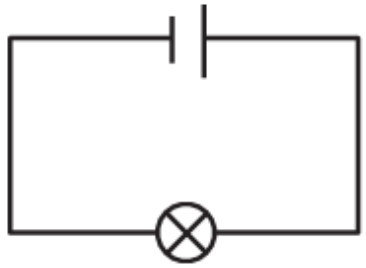
Scientific Symbols

When scientists draw electrical circuits, they use **scientific symbols** to show **different components.**

						
battery or cell	bulb	wire	open switch (off)	close switch (on)	motor	buzzer

Simple Circuit





The circuit has to be complete to allow the **electricity** to travel all the way around it.

Key Vocabulary

appliance – a device or piece of equipment that has been made to perform a specific task
battery – a small item used to power small appliances
circuit – a route through which electricity flows
components – the parts of a circuit
conductor – allows electricity to flow through it
electrical – something that uses electricity to work
insulator – doesn't allow electricity to flow through it
mains power – electricity provided by power stations
portable – can be easily carried around
pylon – a tower used for keeping electrical wires above the ground

Y6 Electricity End of Topic Test

1. Sort these energy sources into renewable and non-renewable. /7

coal, hydro, wind, oil, gas, nuclear, solar

Renewable	Non-renewable

2. Explain the meaning of these words; /2

NC Objective – I understand renewable and non-renewable energy sources

renewable

non-renewable

3. How is wind power produced? /1

NC Objective – I understand renewable and non-renewable energy sources

4. Label these symbols with the correct electrical component /4

NC Objective – use recognised symbols when representing a simple circuit in a diagram.

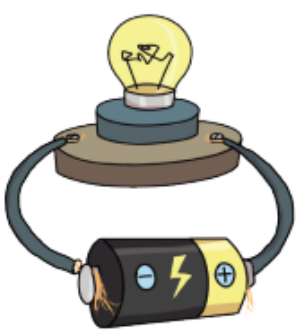



5. Sammy needs to make a simple **circuit** that will light a bulb but she's not sure how to do it. Can you draw a circuit diagram, using symbols, to show her how to set it up? /3

NC Objective – use recognised symbols when representing a simple circuit in a diagram.

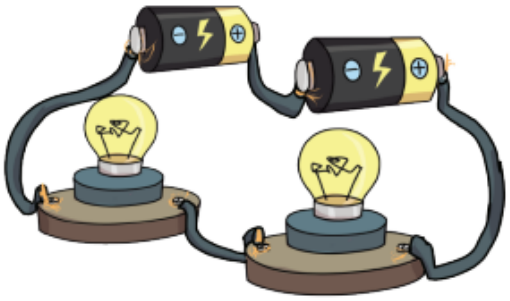
6. The bulb in this circuit won't light up. Give 2 reasons why it might not light up. /2

Y4 LO Link – I can identify whether or not a lamp will light in a simple series circuit.



7. Andy builds the circuit below. The bulbs do light up. /2

NC Objective – I can associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit

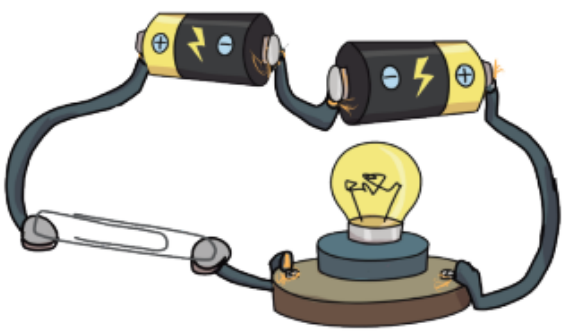


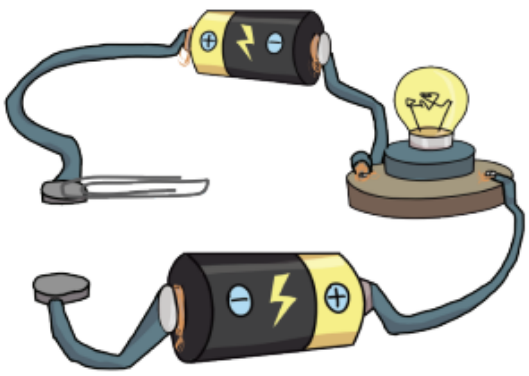
Andy wants to change his circuit so that the two bulbs are brighter.
He can use any other equipment.

Suggest two ways Andy can make his two bulbs brighter.

8. Draw lines to match each circuit to its correct scientific diagram. /2

NC Objective - I can use recognised symbols when representing a simple circuit in a diagram





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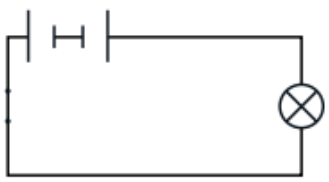

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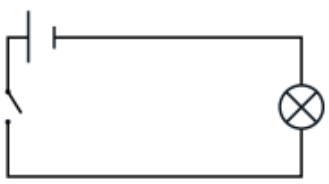

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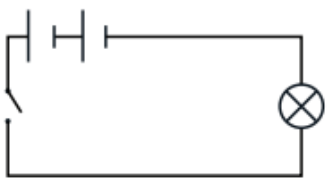

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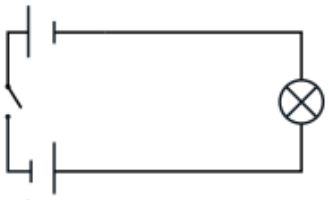

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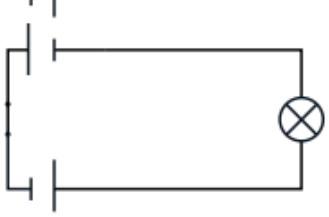
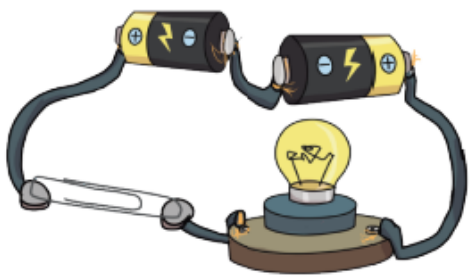


9. If I put more batteries in my circuit, will this affect the volume of the buzzer? Explain your answer. /2

NC Objective - associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.

9. Polly is in a school play. She is dressed as a star. The star costume has bulbs which light up. The picture below shows the circuit that makes the star light up. /3

NC Objective - I can compare and give reasons for variations in how components function



Polly wants the star to shine more **brightly**. She has some ideas about how she can do this. Write **yes or no** next to each idea to show if Polly will see the star shine more brightly.

Idea	Will the star shine more brightly? Yes or no?
add another bulb	
add another cell	
use longer wires	

TOTAL MARKS - /28