Thistly Meadow Primary School

Science Curriculum

Science Intent

At Thistly Meadow, we aim to ensure that all children are given a broad and balanced Science curriculum which enables them to develop their understanding of the world around us. Additionally, we want all children to love Science and to be curious and inquisitive as they go through their lives. Our Science curriculum opens children's eyes to a world of opportunities and the potential to pursue careers such as: astronauts, forensic scientists, palaeontologists and environmental consultants.

To achieve this, we provide foundations for understanding through Biology, Chemistry and Physics knowledge, which has been coherently planned and sequenced, to ensure that all children can access and extend their scientific learning. Furthermore, we plan immersive and engaging practical activities and experiences into our learning sequences, to develop their curiosity and questioning while promoting a love of learning.

Implementation

All of our Science topics are taught within each year group in accordance with their place in the National Curriculum and Early Years Framework.

- Topics are taught as a blocked unit to allow children to focus on one specific area. By studying each topic in depth, children are better able to develop their knowledge and skills.
- Some topics are built on throughout the years, such as living things and their habitats. This allows children to develop a depth of understanding and progression of key skills.
- Some topics are stand alone and specific to given year groups. Knowledge is revisited in these areas through cross-curricular learning, such as Year 4 Everyday Materials links to Year 5 Rivers through knowledge of water cycles.

Curriculum Overview

Foundation Stage
Understanding the World: Early Learning Goals: 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.

Year One				
	Plants	**Everyday Materials**	**Animals including Humans**	**Seasonal Changes**
Objectives:	Identify and name a variety of common wild and garden plants. Including: deciduous and evergreen trees. Identify and describe the basic structure of a variety of common flowering plants, including trees.	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 everyday materials. Compare and group together a variety of everyday materials on the basis of their simple physical properties.	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. Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	Observe changes across the four seasons. Observe and describe weather associated with the seasons and how day length varies.

Year Two				
	Plants	**Uses of Everyday Materials**	**Animals including humans**	**Living Things and their Habitats**
Objectives:	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.	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.	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.	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.

Year Three					
	Plants	Rocks	Animals including humans	Forces and Magnets	Light

Objectives:	Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant. Investigate the way in which water is transported within plants. Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.	Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. Describe in simple terms how fossils are formed when things that have lived are trapped within rock. Recognise that soils are made from rocks and organic matter.	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.	Compare how things move on different surfaces. Notice that some forces need contact between 2 objects, but magnetic forces can act at a distance. Observe how magnets attract or repel each other and attract some materials and not others. Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. Describe magnets as having 2 poles. Predict whether 2 magnets will attract or repel each other, depending on which poles are facing.	Recognise that they need light in order to see things and that dark is the absence of light. Notice that light is reflected from surfaces. Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. Recognise that shadows are formed when the light from a light source is blocked by an opaque object. Find patterns in the way that the size of shadows change.

Year Four

	Sound	Electricity	States of Matter	Animals including humans	Living Things and Their Habitats
Objectives:	Identify how sounds are made, associating some of them with something vibrating. Recognise that vibrations from sounds travel through a medium to the ear. 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.	Identify common appliances that run on electricity. Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. Recognise some common conductors and insulators, and associate metals with being good conductors.	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.	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.	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 Five

	Earth and Space	Properties and Changes of Materials	Animals including humans	Forces	Living Things and Their Habitats
Objectives:	Describe the movement of the Earth and other planets relative to the sun in the solar system. Describe the movement of the moon relative to the Earth. Describe the sun, Earth and moon as approximately spherical bodies. Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.	Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical thermal), and response to magnets. Know that some materials will dissolve in liquid to form a solution, describe how to recover a substance from a solution. Use knowledge of solids, liquids and gases to decide how mixtures might be separated, 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, this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.	Describe the changes as humans develop to old age.	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.	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 Six					
	Light	**Electricity**	**Animals including humans**	**Living Things and Their Habitats**	**Evolution and Inheritance**
Objectives:	Recognise that light appears to travel in straight lines. Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.	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.	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.	Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals. Give reasons for classifying plants and animals based on specific characteristics.	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.

- Through planning and delivery of science lessons, teachers promote enjoyment and foster interest in the three scientific disciplines: biology, chemistry and physics.
- Our planning proforma enables teachers to identify areas of relevant prior and future knowledge that children have/need, to inform their sequence of learning.
- Additionally, teachers are able to identify and prepare for possible areas of misconception. During lessons, teachers use effective assessment for learning strategies to ensure misconceptions are highlighted and addressed.
- Through a range of teaching strategies, planning is effectively differentiated to ensure that it is accessible to all learners. Teachers facilitate opportunities for each child to develop the same level of knowledge and understanding.
- At the start of each topic, children complete a Pre-Topic Assessment which reviews previous learning. It also provides the opportunity for children to share what they already know and consolidate that understanding. In EYFS and Year 1, Pre-Topic is completed verbally to allow children to fully access their understanding.

Science assessment: Everyday Materials

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

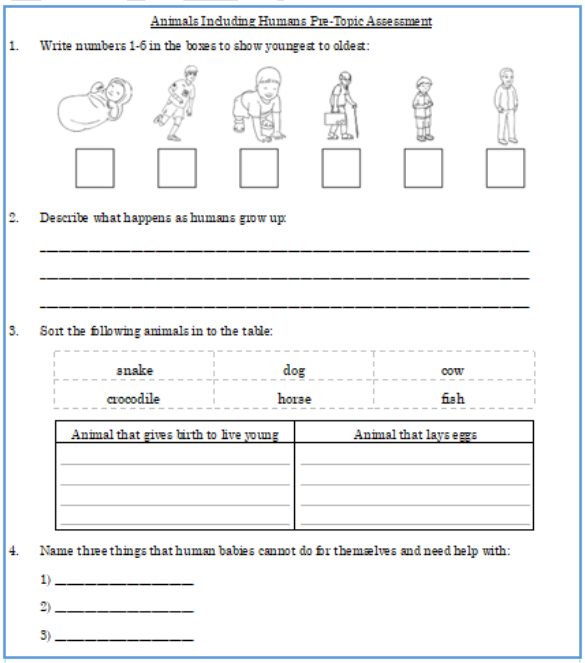
Class discussion: (children shown a variety of materials and key scientific vocabulary)

What do I already know about everyday materials?

I know! I know!

What do I want to know about everyday materials?

What have I learnt that I didn't know before about everyday materials?



Animals Including Humans Pre-Topic Assessment

1. Write numbers 1-6 in the boxes to show youngest to oldest:

2. Describe what happens as humans grow up:

3. Sort the following animals in to the table:

snake	dog	cow
crocodile	horse	fish

Animal that gives birth to live young	Animal that lays eggs

4. Name three things that human babies cannot do for themselves and need help with:

1) _____
2) _____
3) _____

Example 1: Year 1's Everyday Materials Pre-Topic Evidence Sheet

Example 2: Year 5's Animals Including Humans Pre-Topic Assessment.

- To support children in the acquisition of knowledge throughout a topic, knowledge organisers are provided which include key concepts, vocabulary and diagrams. These are used a tool throughout the topic to support the learning.

- Throughout topics, children will revisit and build their knowledge with the intent of answering a 'big question' upon topic completion. These big questions link to overarching concepts which are weaved throughout the whole school science curriculum map. Thus, enabling children to continue their journey exploring areas of science and revisiting previously taught knowledge.
- Big questions are answered in a variety of ways including: debates, posters, written responses and presentations. Children are informed of their big question at the start of each topic and enjoy building up to answering it.

Early Years Foundation Stage (EYFS)

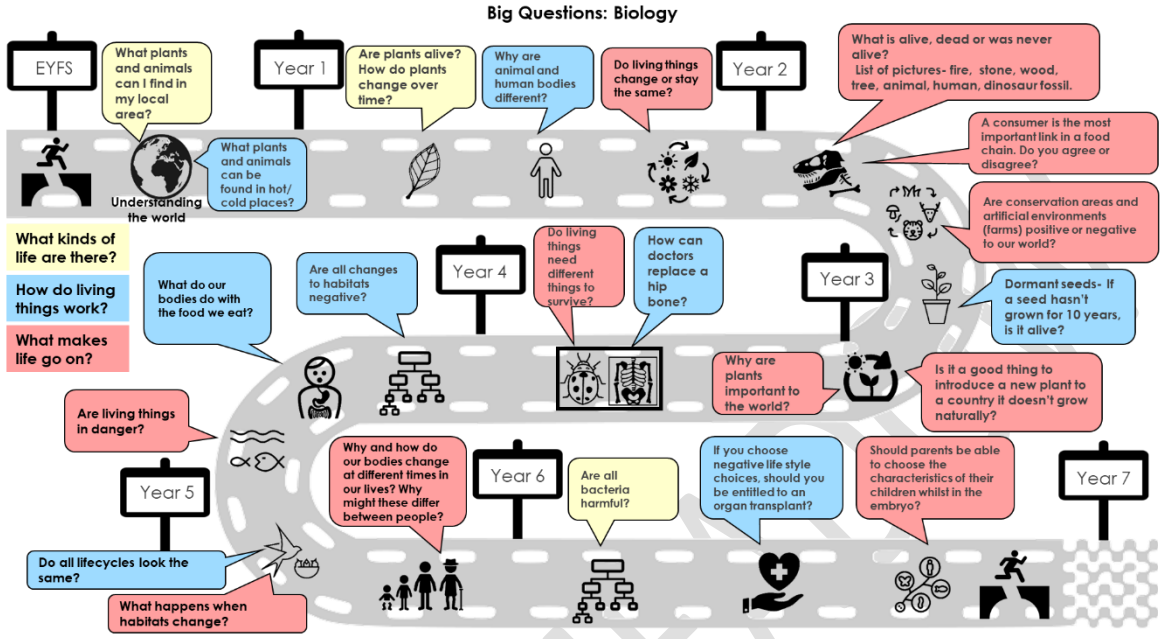
- The EYFS curriculum supports children's understanding of Science through the planning and teaching of 'Understanding the World'. Through their learning, children find out about objects, materials and living things. They are able to use their senses and identify similarities, differences, patterns and changes. Both the learning environment and skilled practitioners foster curiosity and encourage explorative play. Children are motived to ask questions about why things happen and how things work. Our children are encouraged to explore their natural environment. Children enjoy spending time outdoors and observing the changing seasons, plants and animals. Children regularly participate in structured scientific activities such as cookery and baking sessions, as well as daily open ended discovery through sand, water, block and magnet play.

Big Question Road Maps

Biology

Overarching Concepts:

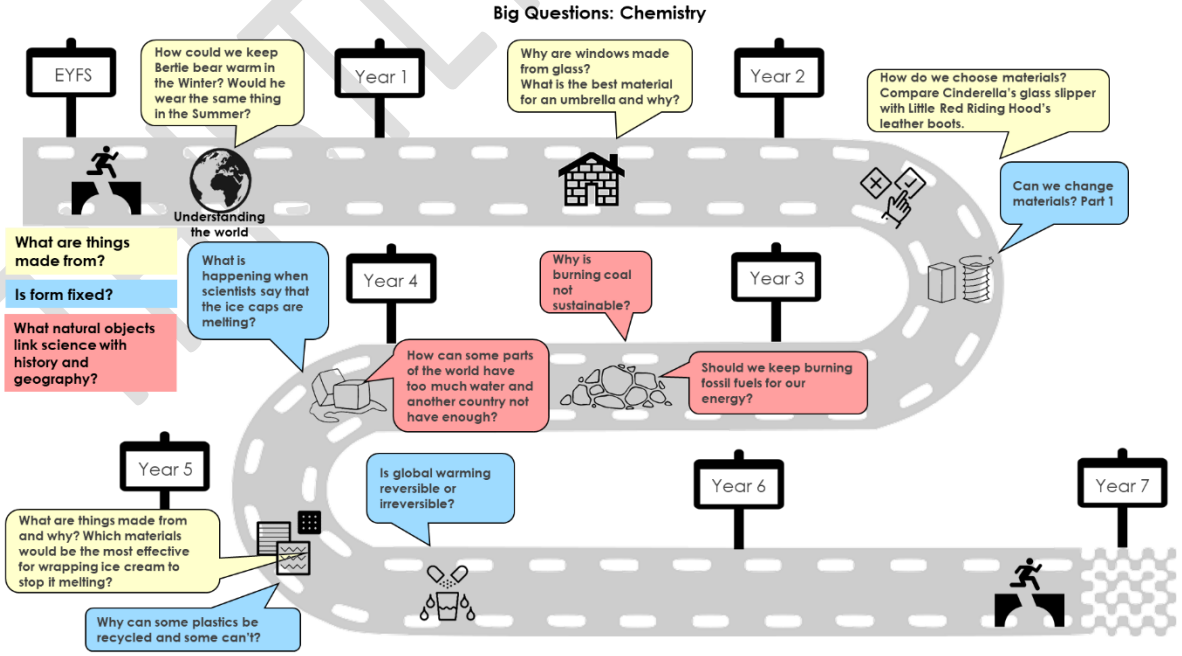
- What kinds of life are there?
- How do livings things work?
- What makes life go on?



Chemistry

Overarching Concepts:

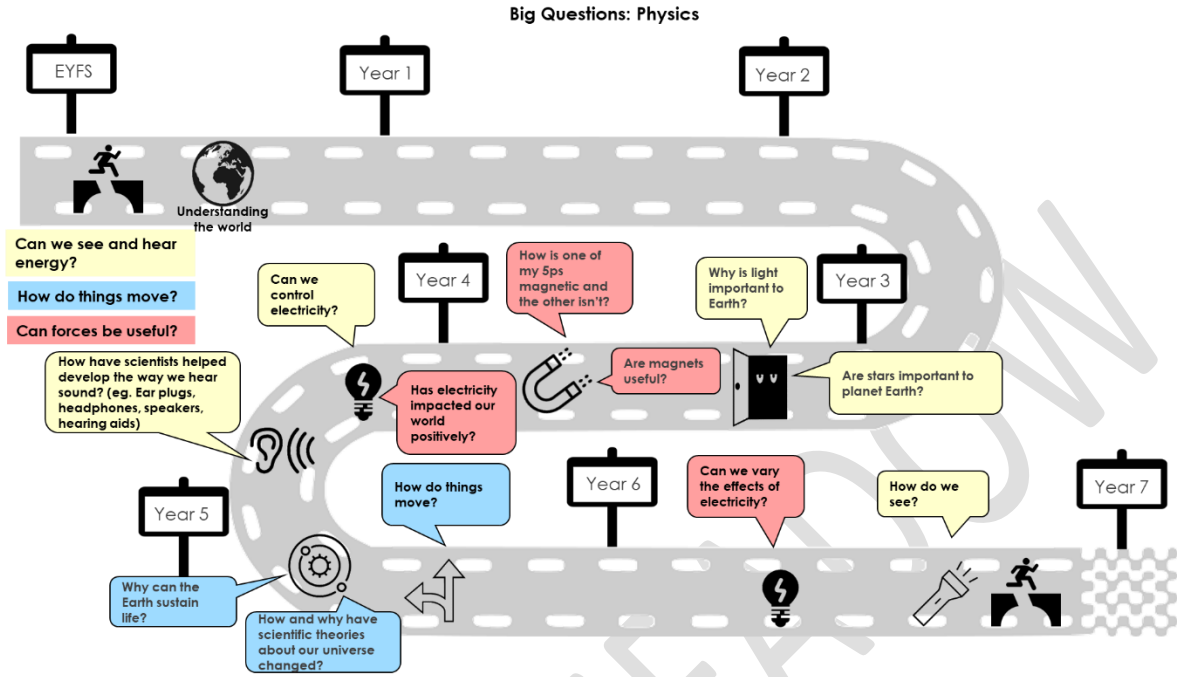
- What are things made from?
- Is form fixed?
- What natural objects link science with history and geography?



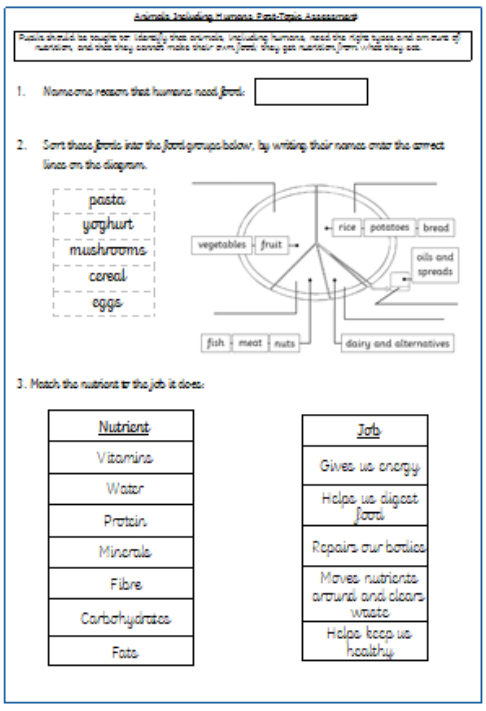
Physics

Overarching Concepts:

- Can we see and hear energy?
- How do things move?
- Can forces be useful?



- At the end of a topic, children will complete a Post-Topic Assessment which will evaluate how much of the topic the children have retained and understood. Teachers can use this to inform personal reflections and future planning of the topic. In Year 1, children complete an 'I have learnt' statement to assess their understanding and level of scientific vocabulary.


Animals Including Humans Post-Topic Assessment

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.

1. Name one reason that humans need food.

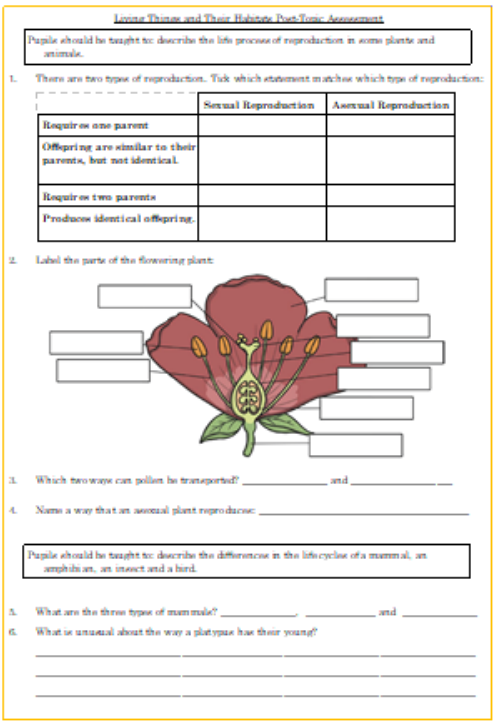
2. Sort these foods into the food groups below, by writing their names onto the correct lines on the diagram.

pasta
yoghurt
mushrooms
cereal
eggs

3. Match the nutrient to the job it does:

Nutrient
Vitamins
Water
Protein
Minerals
Fibre
Carbohydrates
Fats

Job
Gives us energy
Helps us digest food
Repairs our bodies
Moves nutrients around and clears waste
Helps keep us healthy


Living Things and Their Habitats Post-Topic Assessment

Pupils should be taught to: describe the life process of reproduction in some plants and animals.

1. There are two types of reproduction. Tick which statement matches which type of reproduction:

	Sexual Reproduction	Asexual Reproduction
Requires one parent		
Offspring are similar to their parents, but not identical.		
Requires two parents		
Produces identical offspring.		

2. Label the parts of the flowering plant:

3. Which two ways can pollen be transported? _____ and _____

4. Name a way that an asexual plant reproduces: _____

Pupils should be taught to: describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.

5. What are the three types of mammals? _____, _____ and _____

6. What is unusual about the way a platypus has their young?

_____

_____

_____

Examples of sections from Post-Topic Assessments from Key Stage 2.

- Within planning, opportunities for cross-curricular learning is planned for and each topic has been designated a fictional or non-fiction text which can support the learning.
- To enrich the curriculum, children are able to take part in educational visits and visitors are planned for in school workshops and immerse experiences. *Example: Year 5 take part in the Black Hole Planetarium experience and EYFS/KS1 experience hatching and caring for live chicks.* These wider opportunities enhance the pupils' experiences within the Science curriculum and understanding of how their learning links to the wider world.
- In each classroom, children have a Science working wall which they can refer to, to recall knowledge, identify key vocabulary and 'park' questions throughout the topic. Teachers regularly update their displays to be relevant.
- Each year, science is further promoted across the school during British Science Week. All children experience hands-on science activities that links to the relevant theme. This allows our scientific learning to be embedded in their knowledge of the wider world.
- Throughout the school, Science is celebrated through whole school displays, achievement assemblies and in class 'scientist of the week'. This encourages children to actively participate in their learning and provides purpose.

Impact

- The impact of our curriculum design should lead to good progress, for all children, across the key stages. Our sequence of learning provides opportunities for knowledge to be revisited and consolidated. Therefore, we expect children to leave school reaching the age related expectations for Science. Through our practical activities and experiences, external trips and various workshops, children will be enthusiastic and passionate Science learners. They will have an understanding that Science is vital to our lives and the world's future and be empowered to make a difference themselves. Our children's love of Science is evident through their pupil voice, their high-quality work and an overwhelming sense of enjoyment.