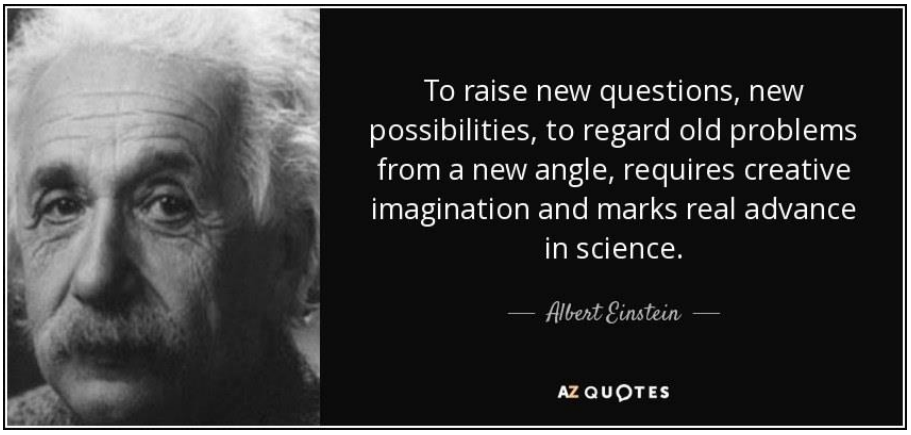
Science @SJB

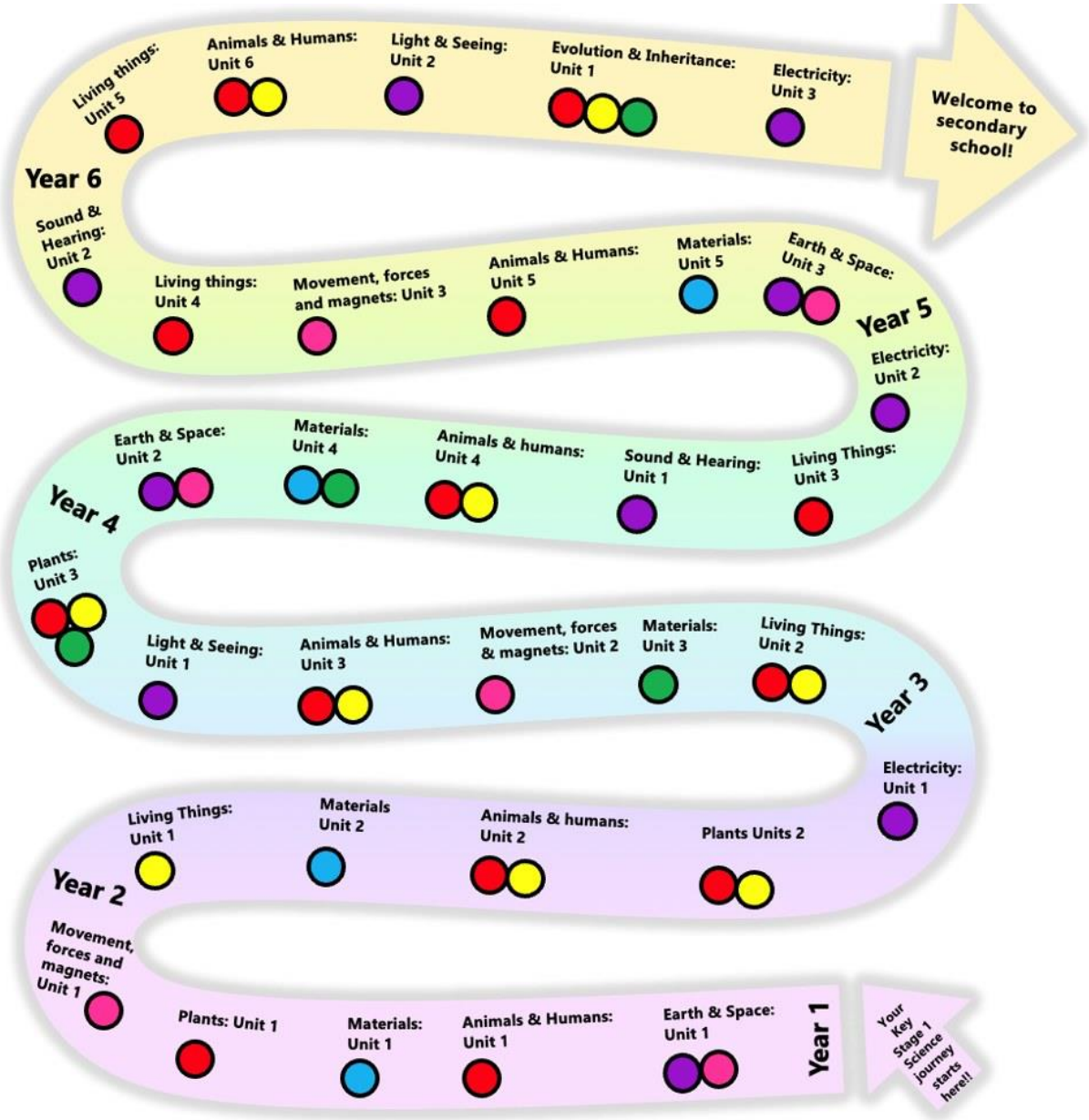
Intent, Implementation, Impact

At St. John Bosco RC Primary School we believe that a high-quality science education provides the foundations for understanding the world. We recognise that science has changed our lives and is vital to the world's future prosperity. We believe that all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes. [1]

Progression of Knowledge and Skill



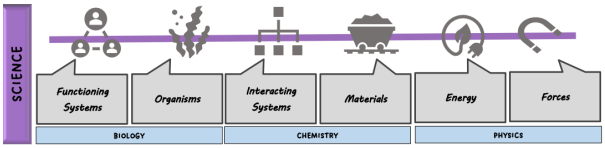
[1] https://www.stjohnboscosunderland.org.uk/wp-content/uploads/sites/7/2022/03/science3i.pdf



1 - Curriculum Narrative

Science is key to providing the foundation for understanding of the changing world. Pupils can develop a sense of excitement and curiosity about natural phenomena. In the EYFS, science is included within "**Understanding of the World**", where pupils learn about science by undertaking activities that help children to develop working scientifically skills and critical thinking. It is introduced, often indirectly, through activities that encourage every child to explore, problem solve, observe, predict, think, make decisions and talk about the world around them. At KS1 and KS2 the curriculum is underpinned by **6 threshold concepts** which are regularly **revisited** and **developed over time**. The units are taught in a carefully sequenced manner; ensuring that pupils **build knowledge**, **understanding** and **enquiry skills**, which offer them the firm foundation as they make the transition to secondary school to continue their studies further. The topics studied are hierarchical, increasing in challenge as pupils progress from Y1-6.

Threshold concepts



Biology-

- Animals, humans and plants are made up of complex interacting systems to function.
- Organisms require a supply of energy for organisms to carry out the basic functions of life and to grow.

Chemistry-

- The Earth is a complex of interacting rock, water, air and life.
- The particle theory of matter is the abstract idea that helps us develop an understanding of why materials behave as they do.

Physics-

- Energy is a powerful and unifying abstract idea which is difficult to define.
- Forces change the state of rest or motion of a body. They hold matter together and interplay between all objects.

Progression of knowledge- Biology

The two threshold concepts in **Biology** are taught across the following 3 topics: *Plants, Animals & Humans and Living things & their habitats.* The concepts stem from the idea that all living organisms are made from cells. Most organisms are multicellular - the organism needs to contain sophisticated systems to carry out the various life processes, which require energy. Pupils start by identifying a variety of common animals, describing and comparing their structure. This then leads to pupils grouping common animals into carnivores, herbivores and omnivores as well as identifying the major parts of the human body. Over time, pupils will explore in more depth the major body systems in humans, linked also to the concept of organism requiring energy. We take the opportunity to study the human digestive, circulatory, respiratory and skeletal systems as well as the importance of nutrition, a balanced diet and the impact of lifestyle choices to build on this concept in humans. It is also explored using food chains, habitats, competition as well as in plants, whereby plant structure, transport of materials, substances required for growth and the life cycle of a flowering plant are studied. We take the opportunity to study flowers, trees and plant growth in the spring and summer months, when use of the outdoor area in school can be maximised to support learning. Organisms also require energy to reproduce; this is explored

in plants and animals whereby lifecycles, sexual and asexual reproduction are studied. We teach evolution and inheritance towards the end of Year 6. This is due to the topic being more conceptually difficult and students can use the knowledge they have gained in the other aspects of Biology to help build on the idea that plants and animals are classified which links to evolution. A good grounding in reproduction also aids pupil understanding of inheritance.

Biology Unit: Animals including humans
What does progression of knowledge look like?

Year	Progression of knowledge..
EYFS	• Help children to investigate their own signs of life and what we need to be healthy] • Learn about the importance of exercise and healthy/ non-healthy foods, this may including cooking or preparing a healthy snack • Teaching pupils how to wash their hands properly and help children go to the toilet and maintain personal hygiene • know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur, and talk about changes • Explore what animals are found on a farm which may include a visit to a local farm to see how animals are cared for • Observe chicks incubating and hatching, keeping a diary and discussing what animals need to keep healthy linking to lifecycles (linking with Living Things unit)
1	• 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
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 (water, food and air) • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene
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
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
5	• Describe the changes as humans develop to old age • Describe the key stages in the growth and development of humans. • Recall some of the changes experienced in puberty. • Investigate the gestation periods of other animals in comparison to humans including the length and mass
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 (NC)	**Ecosystems** • The interdependence of organisms in an ecosystem, including food webs and insect pollinated crops • the importance of plant reproduction through insect pollination in human food security • How organisms affect, and are affected by, their environment, including the accumulation of toxic materials. **Cells and Systems**
	• Recall that cells are the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope • Describe the functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts • Identify the similarities and differences between plant and animal cells • Explain the role of diffusion in the movement of materials in and between cells • Describe the structural adaptations of some unicellular organisms • Describe the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms. **Muscles and bones** • The structure and functions of the human skeleton, to include support, protection, movement and making blood cells • Biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles • The function of muscles and examples of antagonistic muscles. **Food and nutrition** • Content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed • Calculations of energy requirements in a healthy daily diet • The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases • The tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts) • The importance of bacteria in the human digestive system • The effects of recreational drugs (including substance misuse) on behaviour, health and life processes.
	Breathing & respiration • The structure and functions of the gas exchange system in humans, including adaptations to function • The mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases, including simple measurements of lung volume • The impact of exercise, asthma and smoking on the human gas exchange system **Sexual reproduction in humans** • In humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta
	Inheritance, chromosomes, DNA and genes • Heredity as the process by which genetic information is transmitted from one generation to the next • A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model • Differences between species • The variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation • The variation between species and between individuals of the same species 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 • The importance of maintaining biodiversity and the use of gene banks to preserve hereditary material.

Biology Unit: Evolution & Inheritance What does progression of knowledge look like?	
Year	**Progression of knowledge.**
EYFS	• Exploring ideas around me and my friends, we are all the same and we are all different • Exploring differences between different animals or plants • Role play- families, babies and development and caring for a young baby
6	• Recognise that living things have changed over time and that fossils provide information about living • 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 • State what is meant by the term evolution • Identify work done by Charles Darwin, Alfred Wallace, Mary Anning and John Edmonstone.
KS3 (NC)	• Heredity as the process by which genetic information is transmitted from one generation to the next • A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model • Differences between species • The variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation • The variation between species and between individuals of the same species 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 • The importance of maintaining biodiversity and the use of gene banks to preserve hereditary material

Biology Unit: Living things What does progression of knowledge look like?	
Year	**Progression of knowledge.**
EYFS	• Explore the natural world around them, make observations and draw pictures of animals and plants • 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
2	• Identify the differences between things that are living, dead, and things that have never been alive, using some of the 7 life processes (movement, respiration, sensitivity, growth, reproduction, excretion, nutrition) • Identify that most living things live in habitats to which they are suited • Explain in simple terms how an animal or plant is suited to its habitat • Name a variety of plants and animals in their habitats, including micro-habitats • Explain that different conditions in a habitat and micro-habitat can affect the number and type of plants/animals that live there • Describe how plants and animals depend on each other for food and shelter • 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 • Construct a simple food chain that includes humans (e.g. grass, cow, human) with arrows pointing in the correct direction
4	• Know the 7 life processes of living organisms • Use the 7 life processes to determine if an organism is living • Describe similarities and differences between examples of plants and animals • Know the features of mammals, amphibians, fish, birds, reptiles (vertebrates) and invertebrates • Group living things in a variety of ways using key characteristics • Know and explore the work of Carl Linnaeus • Use classification keys to help group and identify a variety of living things in their local and wider environment • Use classification keys to name a variety of living things • Recognise that environments can change, and this can sometimes pose dangers to living things • Understand that human actions can impact the environment and suggest some solutions to the issues.
5	• Know that reproduction is when an animal or plant produces one or more individuals similar to itself • Explain that sexual reproduction requires both male and female DNA (sex cells) and will produce offspring that are similar, but not identical to the parents • Explain that asexual reproduction will produce offspring that is identical to the parent and only requires on parent e.g., bulbs, tubers and runners • Explain the life cycle of a mammal, amphibian, insect and a bird • Explain the process of metamorphosis using frogs and butterflies as examples • Describe the differences in the life cycles of a mammal, amphibian, insect and a bird • Use prior knowledge of parts of a flower to explain the stages involved in the reproduction process (pollination, fertilisation and germination)
6	• Know that living things can be grouped according to different criteria • Know that a cell is made up of nucleus, cytoplasm and membrane • Know that living things can be multicellular or unicellular (bacteria) • Explain in simple terms how the Linnaeus system is used to classify living things • Explain why we need to group living things • Explain possible difficulties with classification (penguins and whales) • Know that classification keys are used to group living things based on recognisable characteristics • Construct a classification key • Explain what microorganisms are and can name some • Give examples of some situations where microorganisms can be helpful • Give examples of some situations where microorganisms can be harmful
KS3 (NC)	**Cells & Organisation** • Cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope • The functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts • The similarities and differences between plant and animal cells • The role of diffusion in the movement of materials in and between cells • The structural adaptations of some unicellular organisms • The hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms. **Interdependence** • The interdependence of organisms in an ecosystem, including food webs and insect pollinated crops • The importance of plant reproduction through insect pollination in human food security • How organisms affect, and are affected by, their environment, including the accumulation of toxic materials. **Reproduction** • Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta • Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms

Biology Unit: Plants What does progression of knowledge look like?	
Year	**Progression of knowledge..**
EYFS	• Explore the world around them by growing, watering plants and observing plant growth • Explore the garden or outdoor areas discovering a range of plants • Learn how to plant seeds • Investigate the life cycles of plants and what we use them for • Link plants to the seasons and what happens to the leaves during winter • Explore a range of flowers or leaves to observe and discuss similarities and differences • Using role play activities to set up a "flower-shop" selling different types of flowers and plants
1	• Flowering plants have a root, stem, leaves and a flower • Trees can be deciduous which means the leaves are lost yearly- usually in the autumn • Trees can be evergreen which means there are always leaves on the tree (leaves are continually replenished throughout the year • Trees and plants have roots, stems and leaves but plants have a softer stem • Trees are made of roots, trunk, branches and leaves. • Grasses and ferns consist entirely of leaves. • In autumn, the leaves on deciduous trees change colour, fruits and nuts fall to the ground. Farmers can harvest the crops. • In Spring, birds sing, trees produce leaves and flowers blossom and the landscape changes • Trees are examples of plants
2	• Plants can grow from seed or bulbs • Seeds and bulbs germinate and grow into seedlings • Seedlings grow into mature plants • Plants need light, water, space, suitable temperature in order to grow • Some plants grow best in full sun • Some plants grow best in the shade • Some plants need lots of water • Some plants don't need much water • Some plants grow quicker than others.
3	• Plants contain roots to absorb water and nutrients from the soil • Plant roots also anchor the plant to provide support • Plants contain a stem/ trunk which is responsible for transporting water and nutrients around the plant. • Plants contain flowers which contain the stamen, carpel, petal, ovule, sepal and stem • Plants need light, water, space, suitable temperature in order to grow • The level of nutrients required depends on the type of plant • Insects like bees and wasps transfer the pollen from the male part of a flower to the female part of other flowers • Seeds can also be dispersed by wind, animal fur, animals eating them (and excreting them), in water and if the seed pod explodes • The roots absorb water from the soil, the stem transports it to the leaves, water evaporates from the leaves which causes more water to be absorbed from the soil
KS3 (NC)	• The role of leaf stomata in gas exchange in plants • Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal • The reactants in, and products of, photosynthesis, and a word summary for photosynthesis • The dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere • The adaptations of leaves for photosynthesis • Plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots • Aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life

Progression of knowledge- Chemistry

The two threshold concepts in **Chemistry** are taught across the *Materials* topic. The concepts stem from the idea that all materials are made from atoms/particles and everyday materials behave in different ways, which can relate to simple physical properties and the arrangement of particles. The concept is more complex and increasingly abstract over the course of the curriculum, which prepares students for Chemistry at secondary school. Other aspects of chemistry that are developed using the concept that earth's resources can occur because of natural phenomena. Pupils start by distinguishing between an object and the materials from which it is made, identifying everyday materials, describing their physical properties, being able to group materials based their properties and comparing the suitability of everyday materials for uses. The opportunity is then taken to look at the physical properties of rocks and rock, fossil and soil formation which links with the concept that earth is a complex of interacting rock water, air and life. As the topic progresses pupils look at the particle model of solids, liquids and gases and what happens to materials when heated or cooled and how evaporation and condensation are related to the water cycle. In Year 5 pupils begin to explore the nature of physical and chemical reactions as well as separating simple mixtures.

Chemistry Unit: Materials What does progression of knowledge look like?	
Year	**Progression of knowledge.**
EYFS	• Use all their senses in hands on exploration of natural materials • Explore collections of materials with similar and/or different properties • Discuss the differences between materials and changes they notice • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter
1	• Correctly identify and name 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 (see vocabulary appendix for examples) of a variety of everyday materials • Compare a variety of everyday materials based on their simple physical properties • Group together a variety of everyday materials based on their simple physical properties
2	• Identify what properties a material needs for a particular purpose • Name the materials from which different objects are made • Recognise suitable and unsuitable choices of materials for purposes based on physical properties • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses • Know that materials can be either man-made or naturally occurring • Group objects into man-made or natural categories • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching
4	• Know that all things are made up of particles • Know that particles are arranged differently in solids, liquids and gases • Name properties of solids, liquids and gases • Compare and group materials together according to if they are solids, liquids and gases, giving reasons to justify their choice • Observe that some materials change state when heated or cooled and can give everyday examples of melting and freezing • Understand that melting and freezing are a state change between solids and liquids • Measure or research the temperature at which melting and freezing occurs for some materials • Know that water freezes at 0 °C and boils at 100 °C • Understand that condensation is a state change from a gas to a liquid • Understand that evaporation is a state change from liquid to gas • Understand that boiling and evaporation are the same state change from liquid to gas but at different temperatures • Know that the speed of evaporation depends on several variables including the temperature • Describe the water cycle • Identify the parts played by evaporation and condensation in the water cycle
5	• Compare and group together everyday materials based on their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets • Discuss the suitability of everyday materials for different purposes based on their properties, giving reasons, based on evidence from comparative and fair tests • Know the difference between reversible and irreversible changes • Demonstrate that dissolving, mixing and changes of state are reversible changes • Explain that some changes results 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 • Understand some materials will dissolve in liquid to form a solution • Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving, and evaporating • Describe how to recover a substance from a solution
KS3 (NC)	• The concept of a pure substance • Mixtures, including dissolving • Diffusion in terms of the particle model • Simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography • The identification of pure substances. • The properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure • Changes of state in terms of the particle model • a simple (Dalton) atomic model • differences between atoms, elements and compounds • Chemical symbols and formulae for elements and compounds • Conservation of mass changes of state and chemical reactions • The varying physical and chemical properties of different elements • The principles underpinning the Mendeleev Periodic Table • The Periodic Table: periods and groups; metals and non-metals • How patterns in reactions can be predicted with reference to the Periodic Table • The properties of metals and non-metals • The chemical properties of metal and non-metal oxides with respect to acidity • Chemical reactions as the rearrangement of atoms • Representing chemical reactions using formulae and using equations • Combustion, thermal decomposition, oxidation and displacement reactions • Defining acids and alkalis in terms of neutralisation reactions • The pH scale for measuring acidity/alkalinity; and indicators • Reactions of acids with metals to produce a salt plus hydrogen • Reactions of acids with alkalis to produce a salt plus water • What catalysts do. • The order of metals and carbon in the reactivity series • The use of carbon in obtaining metals from metal oxides

Biology Unit: Rocks What does progression of knowledge look like?	
Year	**Progression of knowledge.**
EYFS	• Exploring the natural world around them looking at soil and rocks • Discussing experiences of rocks and where they have encountered them and can talk about some of the things that they have observed • Use the creativity table to explore volcanoes and eruptions • Making models out of clay
3	• Name some types of rock and describe the physical features of each • Compare and group together kinds of rocks based on their appearance • Compare and group together different kinds of rocks based on their simple physical properties • Name the 3 types of rocks (igneous, sedimentary and metamorphic) and classify based on their appearance and physical properties (e.g. marble is metamorphic because it is hard and smooth) • Recognise that soils are made from rocks and organic matter • Describe in simple terms how fossils are formed when things that have lived are trapped in rocks
KS3 (NC)	• The composition of the Earth • The structure of the Earth • The rock cycle and the formation of igneous, sedimentary and metamorphic rocks • Earth as a source of limited resources and the efficacy of recycling • The carbon cycle • The composition of the atmosphere • The production of carbon dioxide by human activity and the impact on climate.

Progression of knowledge- Physics

The two concepts in **Physics** are taught across a range of topics including *Light, Sound, Electricity, Earth & Space and Forces & Magnets.* Energy is a fundamental concept of physics that enables the explanation and prediction of many phenomena and contributes to the unification of the various branches of physics. Energy is a difficult concept to understand and master, which is why physics is usually taught from Year 3 onwards. We provide pupils with foundation lessons in earth & space and electricity in Years 1 and 2 to aid in the preparing pupils for this highly abstract concept. The curriculum explores different forms of energy stores including electricity, sound and hearing and light and seeing. Pupils explore light, reflections and shadows before then being able to explain how we see things using ideas about light and its properties. Pupils in Year 4 learn how sounds are made, features of sound waves including pitch, amplitude, and dissipation. Electricity includes common electrical appliances, constructing simple series circuits, common conductors and insulators, recognising components from circuit diagrams and investigating components in series circuits.

Physics Unit: Electricity What does progression of knowledge look like?	
Year	**Progression of knowledge..**
EYFS	• Help children understand how electricity works • Discuss electrical safety including plugs, sockets, switches and electric lamps • Pupils may explore a light bulb by using a magnifying glass to look closely at the filament and the materials it is made from • Explore electricity using wire loop games and discussing observations • Explore simple circuits and their components • Discuss everyday experiences like thunder and lightning
2	• Electricity is a form of energy, used for lighting, heating, making sound and making machines and appliances work. • Pylons and cables carry electricity through the countryside, some electricity cables in busy cities are buried underground • Appliances are devices that run on electricity and they should be used safely (includes, no frayed wires, avoid spillages and keep away from water, not putting objects into sockets • Compare life in a village that has no electricity • A circuit is a complete path around which electricity can flow • Circuits contain components like wires, switches and bulbs.
4	• Electricity is a form of energy, used for lighting, heating, making sound and making machines and appliances work. • Some appliances run on electricity; some plug into the mains electricity and others run on batteries. • An electrical circuit consists of a cell or battery connected to a component using wires. • A series circuit is where all the components of the circuits are joined in one loop. If one part of the loop is incomplete, then the circuit will not work • Names of components include cells, wires, bulbs/ lamps, switches and buzzers • A cell is a single unit, and a battery is a collection of cells • One way to test to see if a circuit is complete is to use a bulb/lamp, if the lamp turns on then the circuit is complete. • Closed switches complete circuits. When a switch is open the bulb/lamp will not light up as the series circuit is incomplete. • Wires are made from metals as they are good conductors of electricity e.g., iron, copper and steel • Insulators are materials that do not allow electricity to pass through them easily e.g., plastic, wood, rubber and glass. • Thomas Edison invented the first practical incandescent light bulb
6	• Recognise circuit symbols in a simple circuit- identify the simple circuit used in a hand torch • Electric current is measured in amperes, current is a flow of charge • Associate the brightness of a lamp or volume of a buzzer with the potential difference in a circuit • Investigate the brightness of a bulb if the PD is increased or the number of bulbs increased in a series circuit • Investigate how the length of wire affects the brightness of a bulb. • Potential difference is measured in volts • Resistance, measured in ohms, as the ratio of potential difference (p.d.) to current • Differences in resistance between conducting and insulating components (quantitative) • Separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects • The idea of electric field, forces acting across the space between objects not in contact
KS3 (NC)	• Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge • Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current • Differences in resistance between conducting and insulating components (quantitative). • Separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects • The idea of electric field, forces acting across the space between objects not in contact.

Physics Unit: Forces & Magnets What does progression of knowledge look like?	
Year	**Progression of knowledge.**
EYFS	• Explore how things work • Explore and talk about different forces they can feel • Talk about the differences between materials and changes they notice • Explore the natural world around them • Describe what they see, hear, and feel whilst outside
1	• Observe and describe different ways of moving • Identify similarities and differences between movement of different objects • Make suggestions about how objects can be made to move • Explore contact forces (push and pull) • Explore how objects sink or float • Know that it is not only ourselves that make things move and ask questions about what is causing movement
3	• Compare how things move on different surfaces • Notice that some forces need contact between two objects, but magnetic forces can act at a distance • Describe magnets as having two poles • Observe how magnets attract or repel each other and attract some materials and not others • Predict whether two magnets will attract and repel each other, depending on which poles are facing • 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
5	• Know the work of Isaac Newton and know that force is measured in Newtons by a Newton Meter • 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 • Identify the effects of water resistance • Identify the effects of friction acting between moving surfaces • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater affect
KS3 (NC)	• Forces as pushes or pulls, arising from the interaction between two objects • Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces • Forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water • Forces measured in newtons, measurements of stretch or compression as force is changed • Force-extension linear relation; Hooke's Law as a special case • Forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only) • Change depending on direction of force and its size. • Speed and the quantitative relationship between average speed, distance and time (speed = distance ÷ time) • The representation of a journey on a distance-time graph • Relative motion: trains and cars passing one another. • Moment as the turning effect of a force • Work done and energy changes on deformation • Opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface. • Magnetic poles, attraction and repulsion • Magnetic fields by plotting with compass, representation by field lines • Earth's magnetism, compass and navigation • The magnetic effect of a current, electromagnets, D.C. motors (principles only)

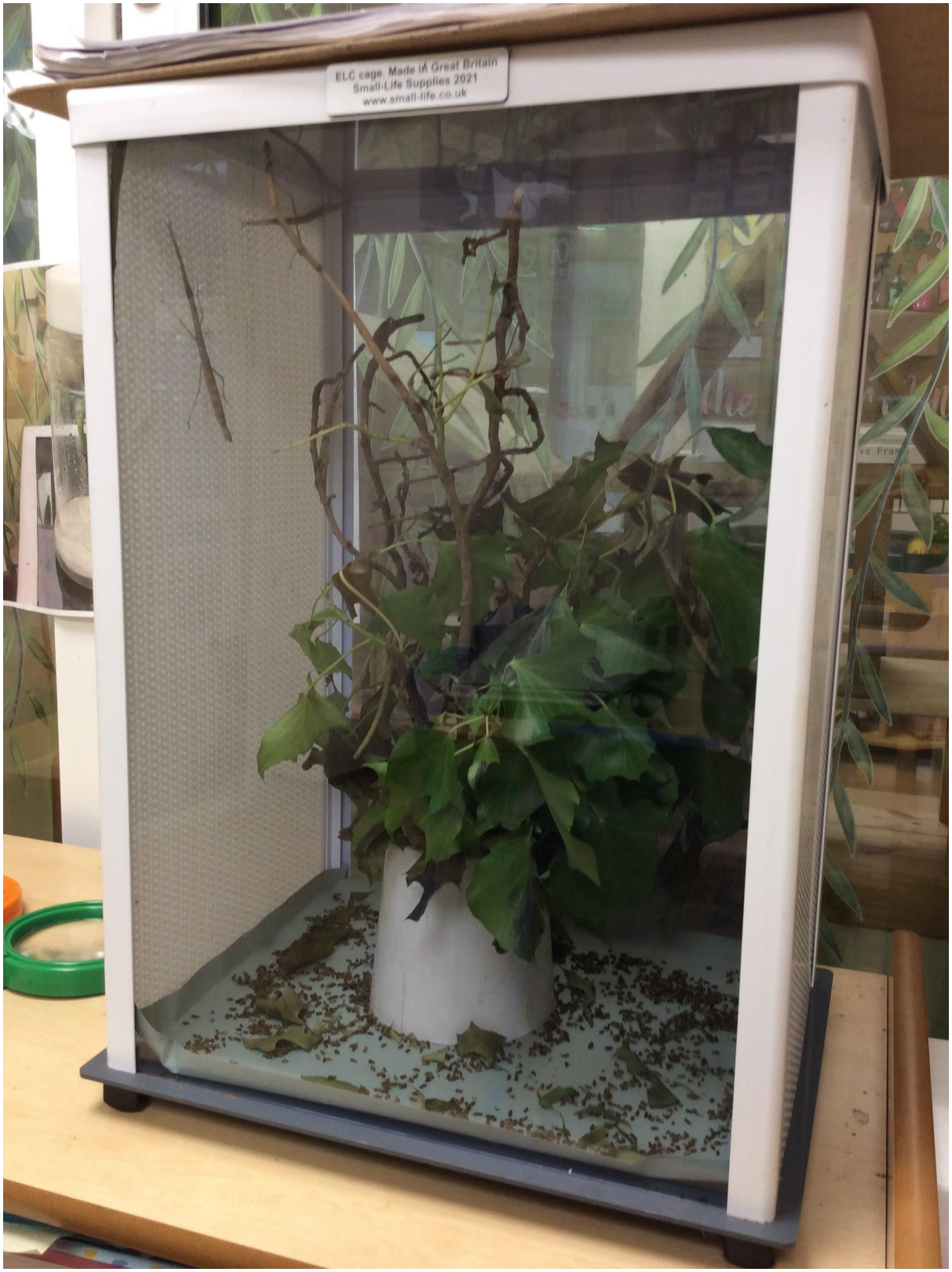
Physics Unit: Light What does progression of knowledge look like?	
Year	**Progression of knowledge..**
EYFS	• Explores colour and how colour can be changed using a range of toys, objects that give off light • Discuss light and dark using the moon and stars, day and night to draw on everyday experiences • Discuss rainbows and the different colours of light, using pupil everyday experiences to build on knowledge • Pupils may use glasses with different coloured filters to explore how colour can be changed
1	• 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
2	• 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
3	• The similarities and differences between light waves and waves in matter • Light waves travelling through a vacuum; speed of light • The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface • Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye • Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras • Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection.
KS3 (NC)	• The similarities and differences between light waves and waves in matter • Light waves travelling through a vacuum; speed of light • The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface • Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye • Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras • Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection

Physics Unit: Sound What does progression of knowledge look like?	
Year	**Progression of knowledge..**
EYFS	• Explore different musical instruments and the sounds they make, making loud and quiet sounds etc. • Discuss everyday experiences of sound, sounds pupils like/ dislike, loud and soft/ quiet sounds • Using experiences of telephones to discuss how sounds are sent and received by our ears and some simple activities to investigate it
4	• 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
5	• Recall the different structures of the ear and the function of each part • Explain how sound waves can be modelled • Describe what happens to a sound wave over time • Calculate the speed of sound in different substances • Explain what an auditory range is • Give examples of animals that have large auditory ranges • Describe how sound can be useful in everyday life
KS3 (NC)	• Frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound • Sound needs a medium to travel, the speed of sound in air, in water, in solids • Sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal • Auditory range of humans and animals • Pressure waves transferring energy; use for cleaning and physiotherapy by ultrasound; waves transferring information for conversion to electrical signals by microphones

Working Scientifically Skills

Working Scientifically Skills							
Code	**A**	**B**	**C**		**D**		**E**
Title	**Asking Questions**	**Test Hypotheses**	**Gathering & Recording**		**Analysis**		**Communication**
How the skills are developed throughout KS1 and KS2	Asking simple questions and recognising that they can be answered in different ways.	Performing simple tests.	Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.	Identifying and classifying.	Observing closely, using simple equipment.	Identifying differences, similarities or changes related to simple scientific ideas and purposes.	Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.
	Asking relevant questions and using different types of scientific enquiries to answer then.	Setting up simple practical enquiries, comparative and fair tests.	Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.	Gathering and recording data to help in answering questions.	Using their observations and ideas to suggest answers to questions.	Using straightforward scientific evidence to answer questions or to support their findings.	Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.
	Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.	Making systematic and careful observations and where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.	Taking measurements using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.	Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.	Using test results to make predictions to set up further comparative and fair tests.	Identifying scientific evidence that has been used to support or refute ideas or arguments.	Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations.

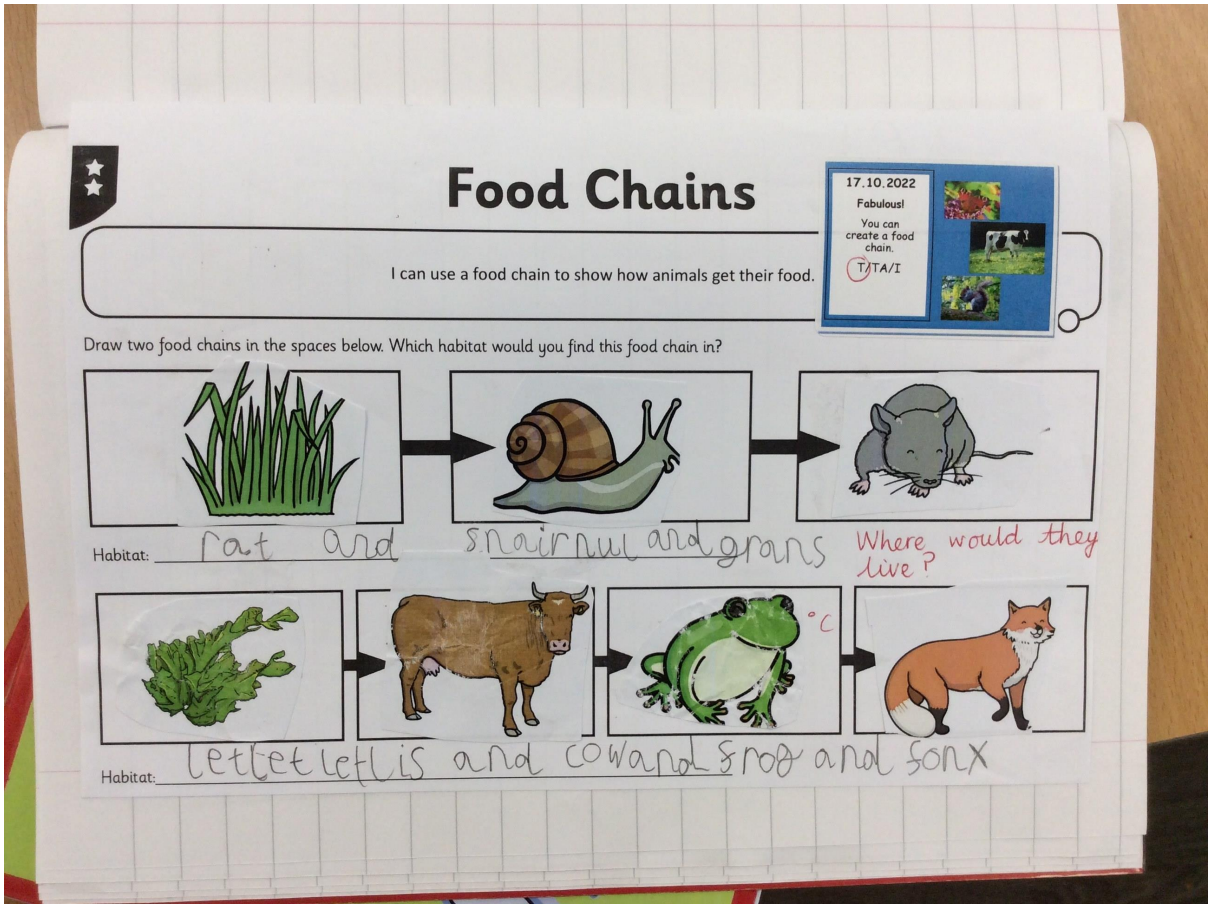
Examples of progression of skills and knowledge.



Living things in EYFS.

- Explore the natural world around them, make observations and draw pictures of animals and plants.
- 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.

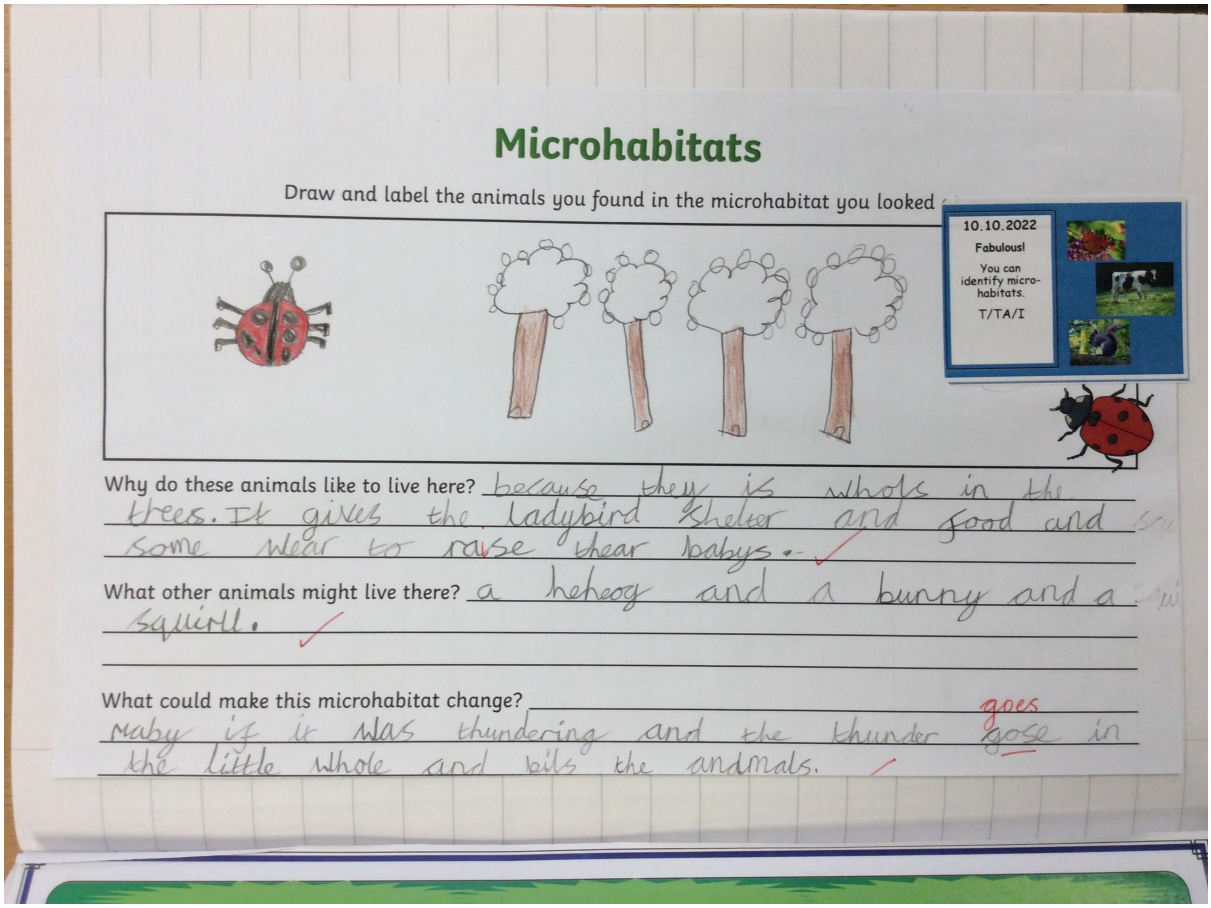


2 - Living things in Year 2.

Wednesday 5th october 2022

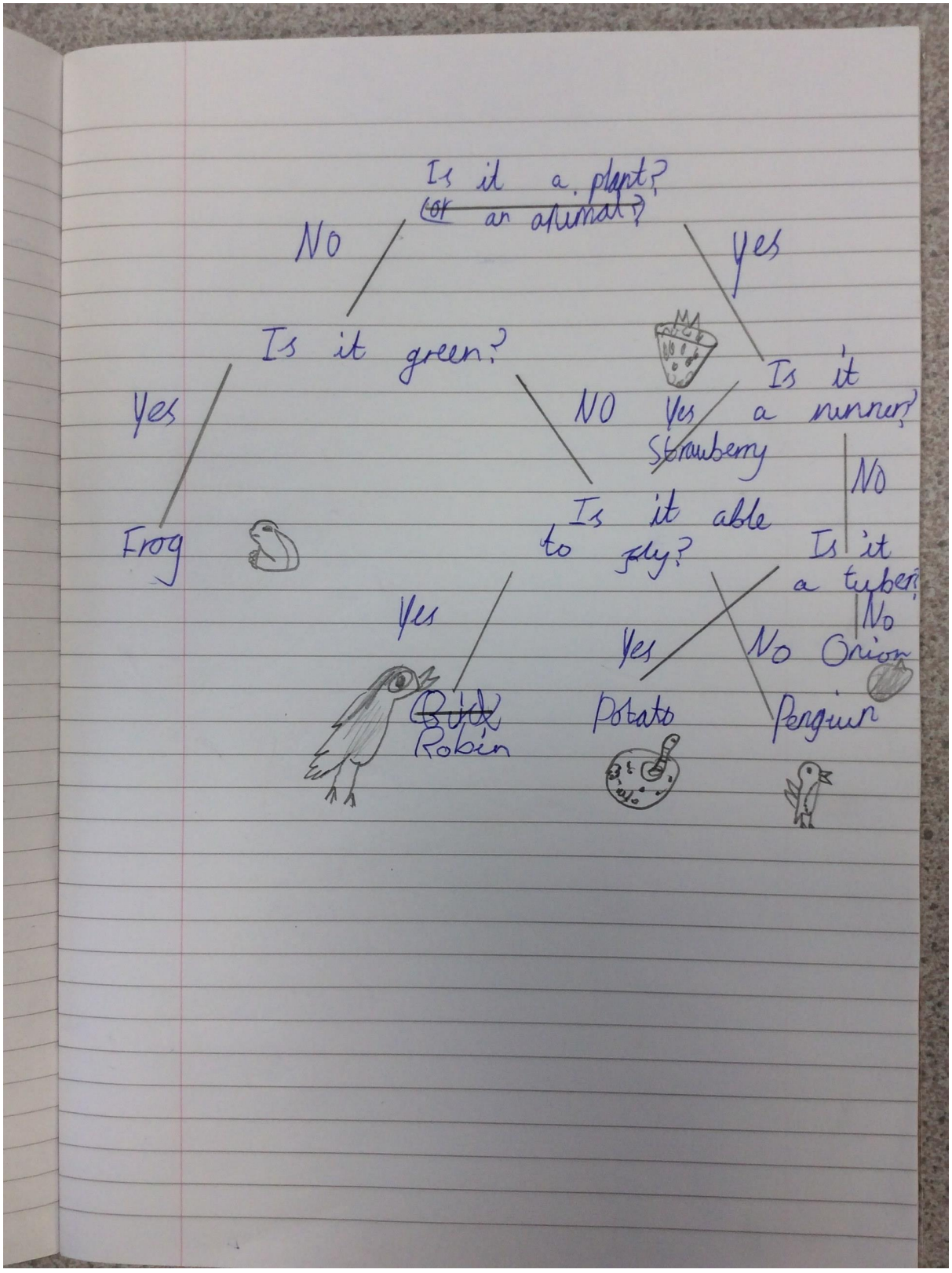
Habitat

Frogs live in a pond so they dowrnt get eatn. They have lilly pads because they need to keep ~~thear~~ their babby eggs safe. When the eggs hach they are tad poels then they turn into groglees then frogs. They like in a pond because they can drink water. Flies are mostley at the pond so the frogs can eat them. The poler beears like in the Arctic so they can stay



Living things in Year 2.

- Identify the differences between things that are living, dead, and things that have never been alive, using some of the 7 life processes (movement, respiration, sensitivity, growth, reproduction, excretion, nutrition).
- Identify that most living things live in habitats to which they are suited.
- Explain in simple terms how an animal or plant is suited to its habitat.
- Name a variety of plants and animals in their habitats, including micro-habitats.
- Explain that different conditions in a habitat and micro-habitat can affect the number and type of plants/animals that live there.
- Describe how plants and animals depend on each other for food and shelter.
- 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.
- Construct a simple food chain that includes humans (e.g. grass, cow, human) with arrows pointing in the correct direction.

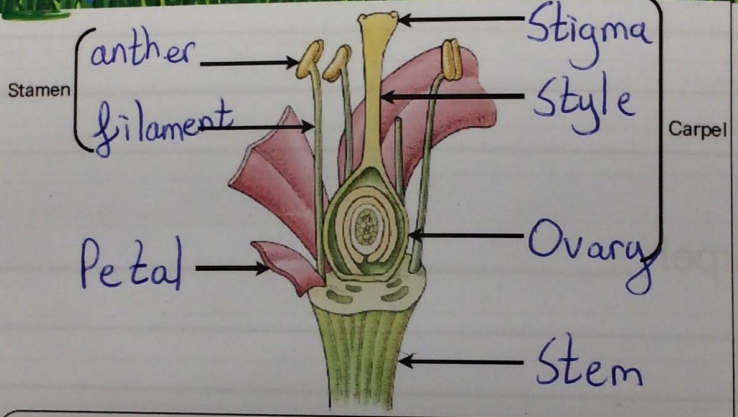


Living things in Year 4.

- Know the 7 life processes of living organisms.
- Use the 7 life processes to determine if an organism is living.

- Describe similarities and differences between examples of plants and animals.
- Know the features of mammals, amphibians, fish, birds, reptiles (vertebrates) and invertebrates.
- Group living things in a variety of ways using key characteristics.
- Know and explore the work of Carl Linnaeus.
- Use classification keys to help group and identify a variety of living things in their local and wider environment.
- Use classification keys to name a variety of living things.
- Recognise that environments can change, and this can sometimes pose dangers to living things.
- Understand that human actions can impact the environment and suggest some solutions to the issues.

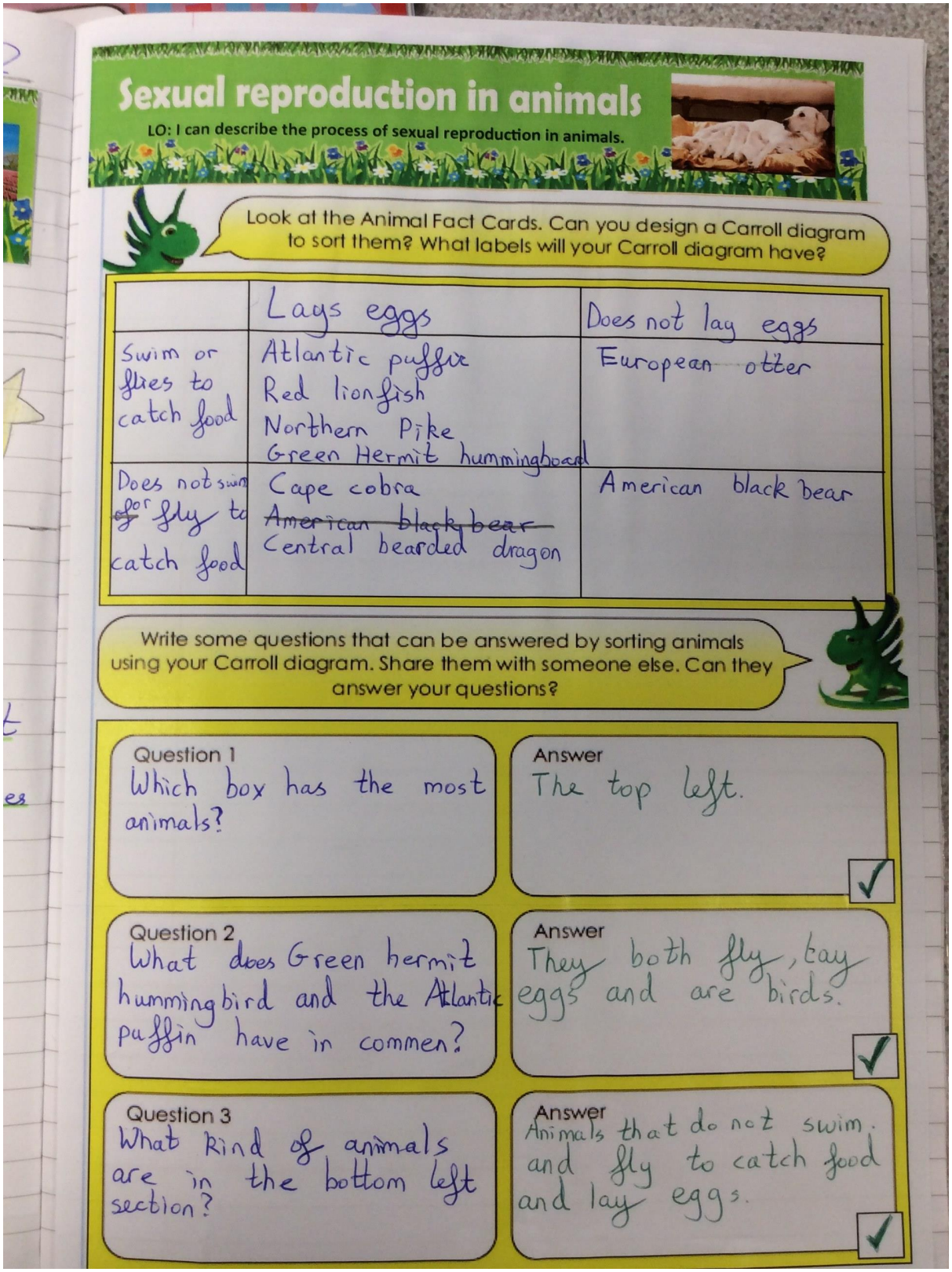
Wednesday 14th September 2022



Word Bank

Petal Anther Style Filament

Stem Stigma Ovary



Sexual reproduction in animals

LO: I can describe the process of sexual reproduction in animals.

Look at the Animal Fact Cards. Can you design a Carroll diagram to sort them? What labels will your Carroll diagram have?

	Lays eggs	Does not lay eggs
Swim or flies to catch food	Atlantic puffin Red lionfish Northern Pike Green Hermit hummingbird	European otter
Does not swim or fly to catch food	Cape cobra ~~American black bear~~ Central bearded dragon	American black bear

Write some questions that can be answered by sorting animals using your Carroll diagram. Share them with someone else. Can they answer your questions?

Question 1
Which box has the most animals?

Answer
The top left. ✓

Question 2
What does Green hermit hummingbird and the Atlantic puffin have in commen?

Answer
They both fly, lay eggs and are birds. ✓

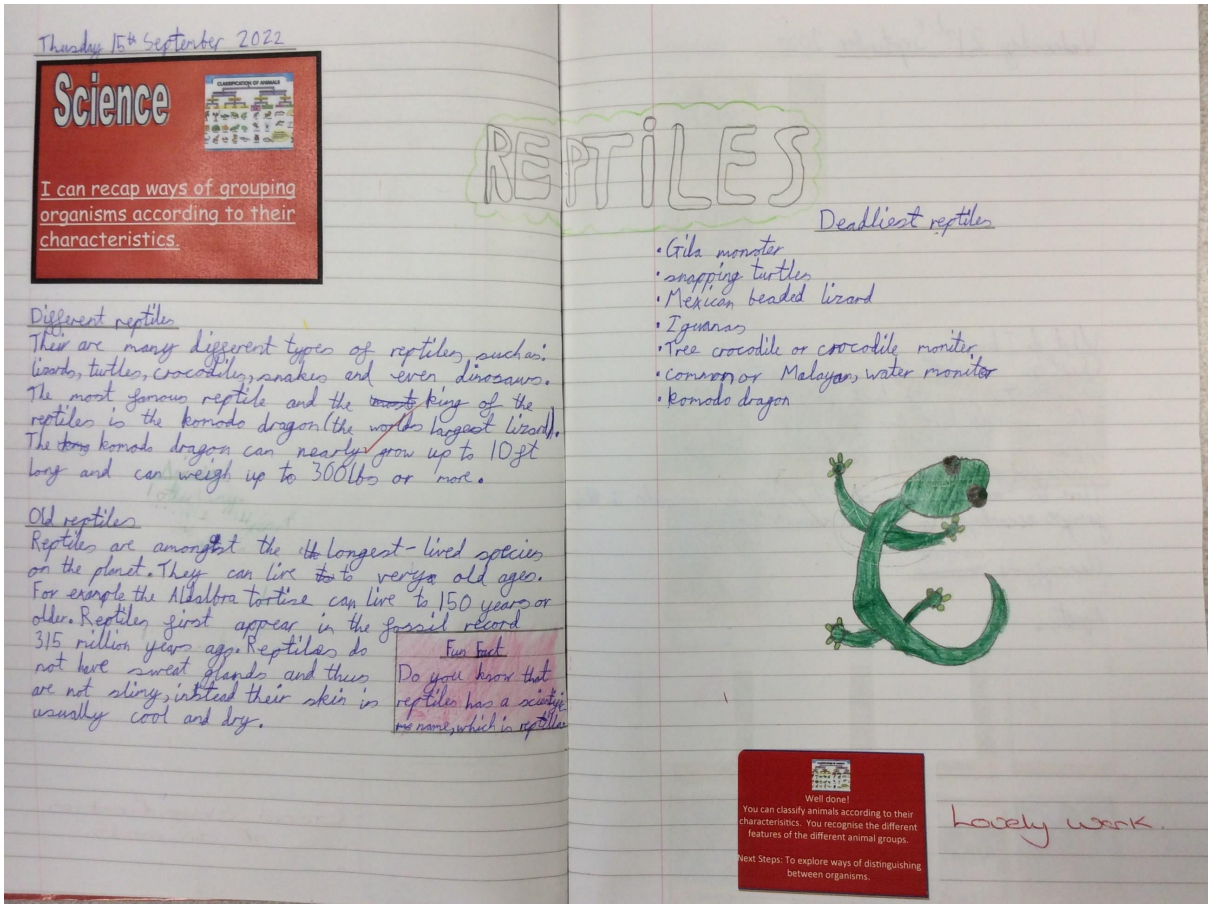
Question 3
What kind of animals are in the bottom left section?

Answer
Animals that do not swim and fly to catch food and lay eggs. ✓

Living things in Year 5.

- Know that reproduction is when an animal or plant produces one or more individuals similar to itself.

- Explain that sexual reproduction requires both male and female DNA (sex cells) and will produce offspring that are similar, but not identical to the parents.
- Explain that asexual reproduction will produce offspring that is identical to the parent and only requires on parent e.g., bulbs, tubers and runners.
- Explain the life cycle of a mammal, amphibian, insect and a bird.
- Explain the process of metamorphosis using frogs and butterflies as examples.
- Describe the differences in the life cycles of a mammal, amphibian, insect and a bird.
- Use prior knowledge of parts of a flower to explain the stages involved in the reproduction process (pollination, fertilisation and germination).



Wednesday 21st September 2022

Science

I can explore ways of distinguishing between organisms that have similar characteristics.

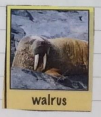
What do I know?
1. Reptile scientific name is Reptilla.
2. Vertebrates have a back bone.
3. All mammals have fur

Classifying Animals
There are other ways of classifying animals in their groups according to their characteristics.

Classifying mammals

Aquatic


dolphin


walrus


killer whale


seal

Tropical


gorilla


tiger


monkey


orangutan

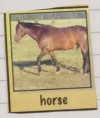

jaguar

Pet


rabbit


ferret


dog


horse


cat

Forest


deer

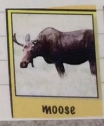

hare


dormouse

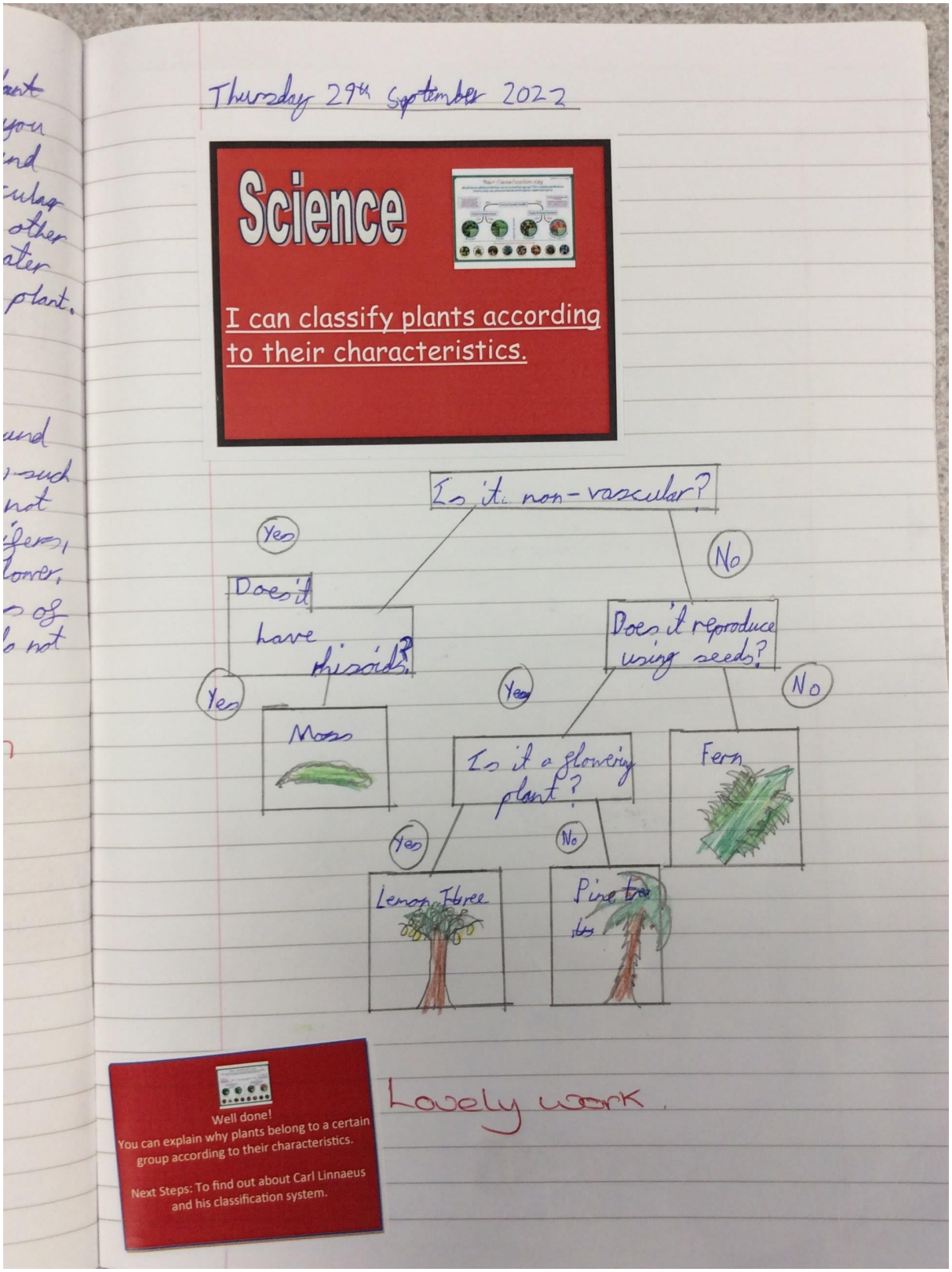

fox


brown bear


squirrel


moose


wolf



Living things in Year 6.

- Know that living things can be grouped according to different criteria.
- Know that a cell is made up of nucleus, cytoplasm and membrane.

- Know that living things can be multicellular or unicellular (bacteria).
- Explain in simple terms how the Linnaeus system is used to classify living things.
- Explain why we need to group living things.
- Explain possible difficulties with classification (penguins and whales).
- Know that classification keys are used to group living things based on recognisable characteristics.
- Construct a classification key.
- Explain what microorganisms are and can name some.
- Give examples of some situations where microorganisms can be helpful.

Curriculum Overviews

YEAR 1	TERM 1		TERM 2		TERM 3	
Science	Plants (1) To identify the main parts of the plant are the flower, stem, leaves and roots To know the different parts of the plant have different functions Roots – anchor the plant Leaf – makes food Stem – carries water Flower – attracts insects Trees are a type of plant There are two main types of tree; deciduous and evergreen Autumn and Spring are two of the four seasons To know In the autumn, the leaves on deciduous trees change colour and fall to the ground To know In the spring many plants begin to regrow, trees and large bushes begin to blossom	Animals inc Humans (1) Recognise that animals, including humans, have offspring which grow into adults Recognise how animals grow (Lifecycles) Identify and describe the basic need 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	Materials (1) Correctly identify and name 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 (see key vocabulary) of a variety of everyday materials. Compare a variety of everyday materials on the basis of their simple physical properties. Group together a variety of everyday materials on the basis of their simple physical properties.	Earth and Space (1) Name the 4 seasons and say when in the year they occur Observe and describe weather associated with the seasons Observe changes across the 4 seasons Can describe other features that change throughout the year that are caused by the change in weather e.g. numbers of mini beasts found outside, seed and plant growth, leaves on trees, clothes worn by people, hibernation and migration Explain how day length varies across the year (longer in summer, shorter in winter)		Forces and Magnets (1) Observe and describe different ways of moving Identify similarities and differences between movement of different objects Make suggestions about how objects can be made to move Explore contact forces (push and pull) Know that it is not only ourselves that make things move and ask questions about what is causing movement Explore how objects sink or float

YEAR 2	TERM 1		TERM 2		TERM 3	
Science	**Living Things** ▪ Identify the differences between things that are living, dead, and things that have never been alive, using some of the 7 life processes (movement, respiration, sensitivity, growth, reproduction, excretion, nutrition). ▪ Identify that most living things live in habitats to which they are suited. ▪ Explain in simple terms how an animal or plant is suited to its habitat. ▪ Name a variety of plants and animals in their habitats, including micro-habitats. ▪ Explain that different conditions in a habitat and micro habitat can affect the number and type of plants/animals that live there. ▪ Describe how plants and animals depend on each other for food and shelter. ▪ 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.	**Plants** ▪ Plants can grow from seed or bulbs ▪ Seeds and bulbs germinate and grow into seedlings ▪ Seedlings grow into mature plants ▪ Plants need light, water, space, suitable temperature in order to grow ▪ Some plants grow best in full sun ▪ Some plants grow best in the shade ▪ Some plants need lots of water ▪ Some plants don't need much water ▪ Some plants grow quicker than others.	**Animals, including humans.** • Notice that animals, including humans, have offspring which grow into adults. • Some offspring are born live and others hatch from eggs. • Some offspring look like their parents and others don't.	**Materials** ▪ Identify what properties a material needs for a particular purpose. ▪ • Name the materials from which different objects are made. ▪ • Recognise suitable and unsuitable choices of materials for particular purposes based on physical properties (see ▪ vocabulary appendix for examples). ▪ • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, ▪ rock, paper and cardboard for particular uses. ▪ • Know that materials can be either man-made or naturally occurring. ▪ • Group objects into man-made or natural categories. ▪ • Find out how the shapes of solid objects made from some materials can be changed by	**Animals, including humans.** ▪ 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	**Electricity** ▪ Electricity is a form of energy, used for lighting, heating, making sound and making machines and appliances work. ▪ Pylons and cables carry electricity through the countryside, some electricity cables in busy cities are buried underground ▪ Appliances are devices that run on electricity and they should be used safely (includes, no frayed wires, avoid spillages and keep away from water, not putting objects into sockets ▪ Compare life in a village that has no electricity ▪ A circuit is a complete path around which electricity can flow ▪ Circuits contain components like wires, switches and bulbs.

4 - Year 2

YEAR 3	TERM 1		TERM 2		TERM 3	
Science	**Plants (3)** - To identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. - To 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. - To investigate the way in which water is transported within plants. - To explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.	**Animals inc Humans (3)** To Identify that animals, including humans need the right types and amount of nutrition, and that they cannot make their own food; To understand they get nutrition from what they eat. To Identify that humans and some other animals have skeletons and muscles for support, protection and movement. To identify and group animals with and without skeletons. To compare and contrast the diets of animals (including pets) and group them.	**Living things (2)** To Know the 7 life processes of living organisms. To use the 7 life processes to determine if an organism is living. To describe similarities and differences between examples of plants and animals. To state the features of mammals, amphibians, fish, birds, reptiles (vertebrates) and invertebrates. To group living things in a variety of ways using key characteristics. To know and explore the work of Carl Linnaeus. To use classification keys to help group, identify a variety of living things in their local and wider environment. To use classification keys to name a variety of living things. To recognise that environments can change and this can	**Movement/Forces Magnets (2)** To compare how things move on different surfaces To notice that some forces need contact between two objects, but magnetic forces can act at a distance To describe magnets as having two poles To observe how magnets attract or repel each other and attract some materials and not others To 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. To predict whether two magnets will attract and repel each other, depending on which poles are facing	**Materials (3)** To Know that all things are made up of particles. To Know that particles are arranged differently in solids, liquids and gases. To name properties of solids, liquids and gases. To compare and group materials together according to if they are solids, liquids and gases, giving reasons to justify their choices. To observe that some materials change state when heated or cooled, and are able to give everyday examples of melting and freezing. To understand that melting and freezing are a state change between solids and liquids. To measure or research the temperature at which melting and freezing	**Light/Seeing (1)** To understand you need light in order to see things and that dark is the absence of light. To notice that light is reflected from surfaces. To understand light from the sun can be dangerous and that there are ways to protect your eyes. To explain how Shadows are formed when the light from a light source is blocked by an opaque object. To find patterns in the way that the size of shadows change

5 - Year 3

YEAR 4	TERM 1		TERM 2		TERM 3	
Science	**Living Things (3)** To Know that reproduction is when an animal or plant produces one or more individuals similar to itself. To explain that sexual reproduction requires both male and female DNA (sex cells) and will produce offspring that are similar but not identical to the parents. To explain that asexual reproduction will produce offspring that are identical to the parent and only requires one parent e.g. bulbs, tubers and runners. To explain the life cycle of a mammal, amphibian, insect and bird To explain the process of metamorphosis using frogs and butterflies as examples Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.	**Animals and Humans (4)** To describe the simple functions of the basic parts of the digestive system in humans To identify the different types of teeth in humans and their simple functions To compare the teeth or carnivores and herbivores and suggest reasons for differences To construct and interpret a variety of food chains, identifying producers, predators and prey	**Materials (4)** To 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. To discuss the suitability of everyday materials for different purposes based on their properties, giving reasons, based on evidence from comparative and fair tests. To know the difference between reversible and irreversible changes. To demonstrate that dissolving, mixing and changes of state are reversible changes. To 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	**Sound (1)** To Know sound vibrations, make the air around the object vibrate and the vibrations travel in waves. To Know Sound waves enter the ear canal and travel to the eardrum. To understand that The eardrum vibrates and sends vibrations to the 3 small bones in the ear. The 3 small bones increase the vibrations and send them to the cochlea. Inside the cochlea there are thousands of hair cells. Hair cells change the vibrations into electrical signals which are then sent to the brain via the auditory nerve. To understand The pitch of a sound can be changed e.g. a thin, stretched guitar string will produce a higher pitch than a loose, thick guitar string. To understand The volume of a sound can	**Electricity (2)** To know Electricity is a form of energy, used for lighting, heating, making sound and making machines and appliances work. To understand that some appliances run on electricity; some plug into the mains electricity and others run on batteries. To know that an electrical circuit consists of a cell or battery connected to a component using wires. To know a series circuit is where all the components of the circuits are joined in one loop. If one part of the loop is incomplete, then the circuit will not work To know names of components include cells, wires, bulbs/ lamps, switches and buzzers A cell is a single unit, and a battery is a collection of cells One way to test to see if a circuit is complete is to use a	**Space (2)/ Rocks** Name some types of rock and describe the physical features of each Compare and group together kinds of rocks based on their appearance Compare and group together kinds of rocks based on their simple physical properties Name the 3 types of rocks (igneous, sedimentary and metamorphic) and classify based on their appearance and physical properties (e.g. marble is metamorphic because it is hard and smooth) Describe how the 3 rock types are formed (the rock cycle) Recognise that soils are made from rocks and organic matter Describe in simple terms how fossils are formed when things that have lived are trapped in rock

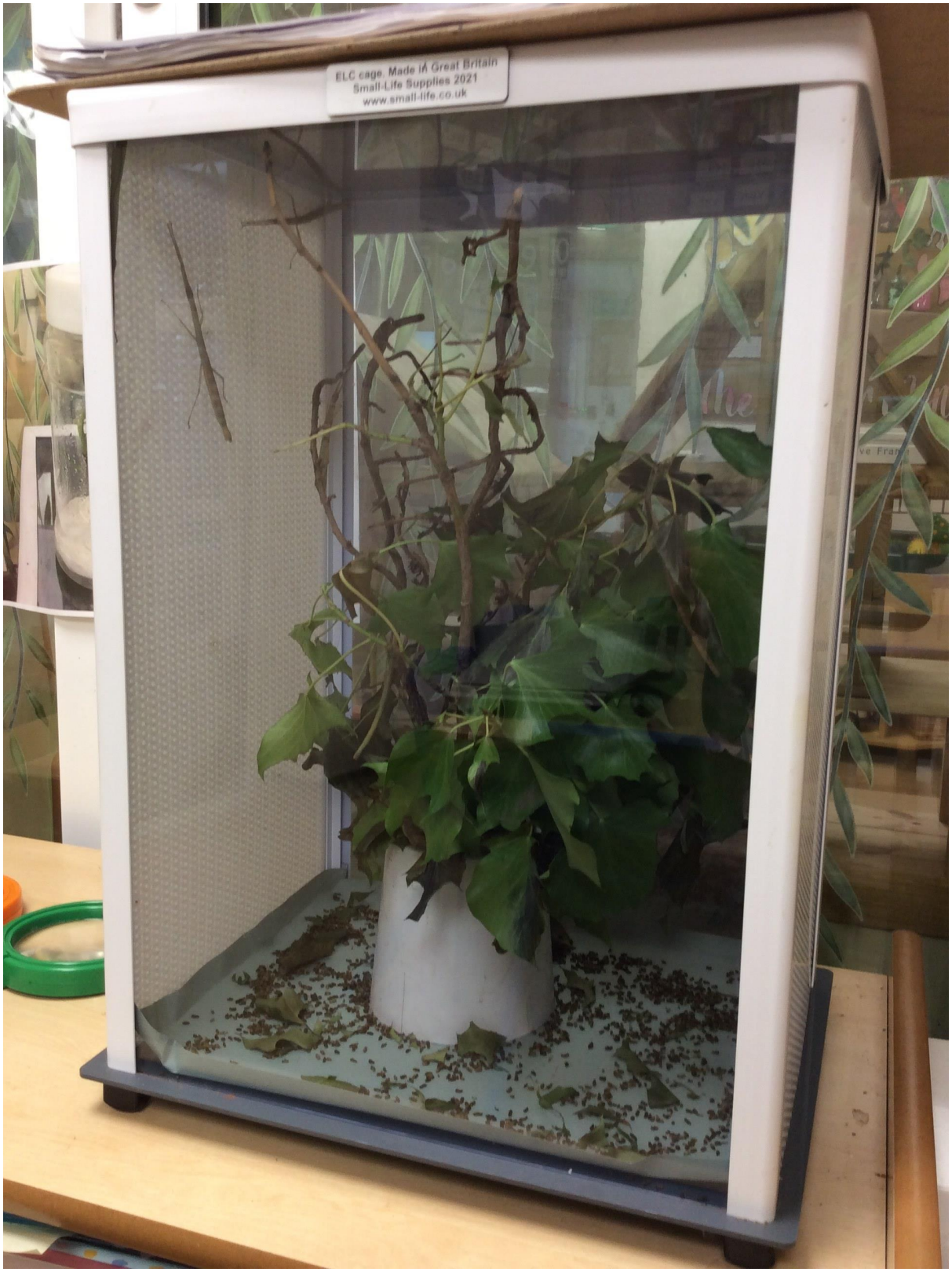
6 - Year 4

YEAR 5	TERM 1		TERM 2		TERM 3	
Science	**Living things** • Know that reproduction is when an animal or plant produces on or more individuals similar to itself. • Explain that sexual reproduction requires both male and female DNA (sex cells) and will produce offspring that are similar, but not identical to the parents. • Explain that asexual reproduction will produce offspring that is identical to the parent and only requires on parent e.g., bulbs, tubers and runners. • Explain the life cycle of a mammal, amphibian, insect and a bird. • Explain the process of metamorphosis using frogs and butterflies as examples. • Describe the differences in the life cycles of a mammal,	**Animals and humans** Describe the changes as humans develop to old age Describe the key stages in the growth and development of humans. Recall some of the changes experienced in puberty. Investigate the gestation periods of other animals in comparison to humans including the length and mass	**Materials** • 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. • Discuss the suitability of everyday materials for different purposes based on their properties, giving reasons, based on evidence from comparative and fair tests. • Know the difference between reversible and irreversible changes. • Demonstrate that dissolving, mixing and changes of state are reversible changes. • Explain that some changes results 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. • Understand some materials will dissolve in	**Movement, forces and magnets** • Know the work of Isaac Newton and know that force is measured in Newtons by a Newton Meter • 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 • Identify the effects of water resistance • Identify the effects of friction acting between moving surfaces • Recognise that some mechanisms,	**Earth and Space** Name the planets of Our Solar System and understand Our place in Our universe, describe the Sun, Earth, Moon and other planets as approximately spherical bodies • Describe the movement of the Earth around the sun in the solar system (a full orbit is 365 days, the Earth spins on its axis every 24 hours) Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the day • Describe the movement of the moon relative to the Earth (lunar cycles take 28 days, the lunar cycle and eclipses) Describe the movement of the other planets relative to the sun in the solar system (fixed orbits) Describe what meteors are, and name	**Sound and Hearing** • Recall the different structures of the ear and the function of each part • Explain how sound waves can be modelled • Describe what happens to a sound wave over time • Calculate the speed of sound in different substances • Explain what an auditory range is • Give examples of animals that have large auditory ranges • Describe how sound can be useful in everyday life

7 - Year 5

YEAR 6	TERM 1		TERM 2	TERM 3	
Science	**Living Things (5)** • Know that living things can be grouped according to different criteria. • Know that a cell is made up of nucleus, cytoplasm and membrane. • Know that living things can be multicellular or unicellular (bacteria). • Explain in simple terms how the Linnaeus system is used to classify living things. • Explain why we need to group living things. • Explain possible difficulties with classification (penguins and whales). • Know that classification keys are used to group living things based on recognisable characteristics. • Construct a classification key. • Explain what microorganisms are and can name some. • Give examples of some situations where	**Animals and Humans (6)** The circulatory system allows blood to carry oxygen and nutrients to be delivered around our body. ▪ The circulatory system is made up of the heart, lungs, arteries, veins and capillaries. ▪ The heart is a muscle which helps to pump blood around the body. It has 4 chambers. Oxygenated blood enters the heart and is pumped around the body via arteries. Deoxygenated blood returns to the heart via veins and is sent to the lungs to be oxygenated. ▪ Our heart rate increases as we exercise. This can be measured by feeling your pulse before and after exercise. ▪ Drugs, alcohol and tobacco can have a detrimental impact	**Evolution (1)** State what is meant by the term evolution. State the evolution occurs over a long period of time (for multi cellular organisms) Recall how fossils are formed. Identify why species show variation. Explain how animals and plants are adapted to their environment. Explain what a habitat is. Identify work done by Charles Darwin, Alfred Wallace, Mary Anning and John Edmonstone. State the environment humans evolved in. Explain how geographical location has resulted in the evolution of a spectrum of skin colours.	**Light and Seeing (2)** ▪ Light comes from a source and we see things when light comes directly from the source or when it is reflected off an object. ▪ Light travels in straight lines ▪ Light enters the eye and our eye and brain work together to 'see' ▪ Light is reflected off all surfaces which is why we can see things ▪ Shadows are formed when the light from a light source is blocked by an opaque object ▪ Shadows have the same shapes as objects that cast them ▪ Rainbows are formed when sunlight is scattered from raindrops into the eyes of an observer.	**Electricity (3)** • Recognise circuit symbols in a simple circuit- identify the simple circuit used in a hand torch • Electric current is measured in amperes, current is a flow of charge • Associate the brightness of a lamp or volume of a buzzer with the potential difference in a circuit • Investigate the brightness of a bulb if the PD is increased or the number of bulbs increased in a series circuit • Investigate how the length of wire affects the brightness of a bulb. • Potential difference is measured in volts

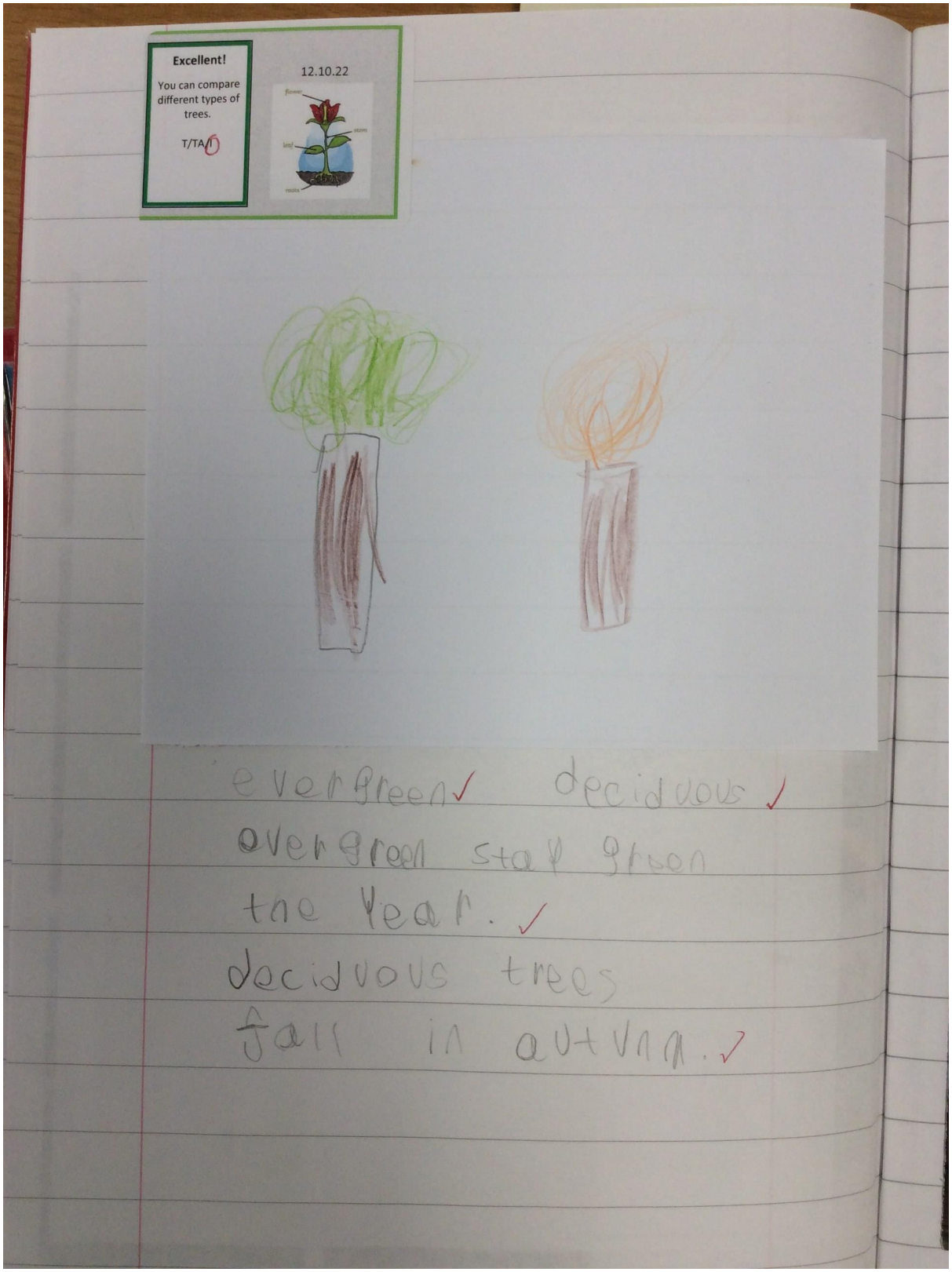
EYFS


ELC cage. Made in Great Britain
Small-Life Supplies 2021
www.small-life.co.uk


St John Bosco School
Garden
GARDEN
GARDEN


2. wet hands

Year 1

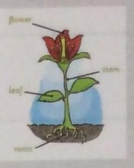

Excellent!
You can compare different types of trees.
T/TA
12.10.22
flower
stem
leaf
roots
evergreen ✓ deciduous ✓
evergreen stay green
the year. ✓
deciduous trees
fall in autumn. ✓

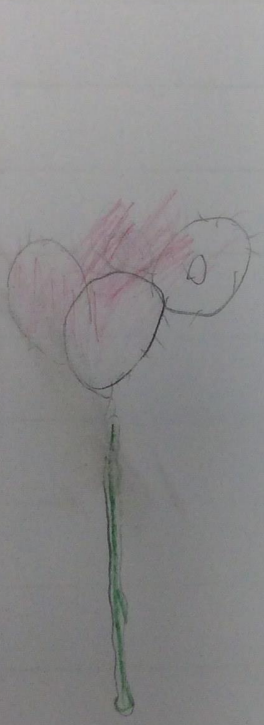
Excellent!

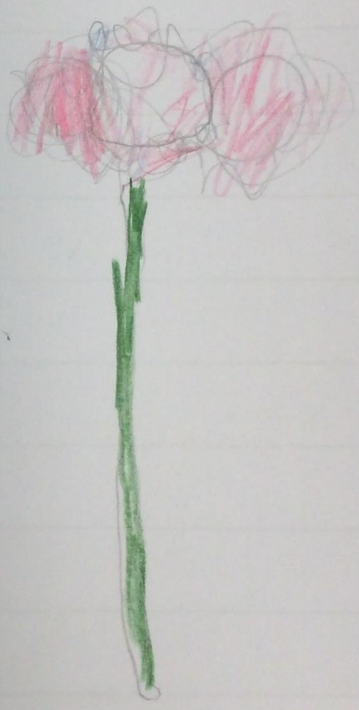
You can report the findings of water transportation through plants.

T/TA/I

26.09.22







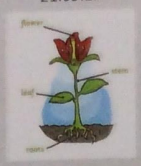
The water when up the stem. It turned the petals blue.

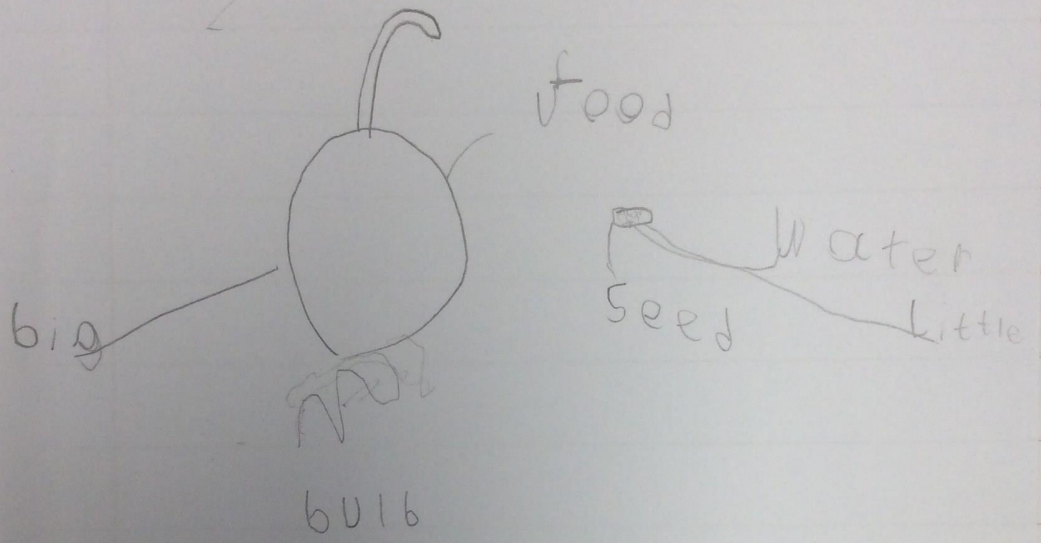
Excellent!

You can describe and compare seeds and bulbs.

T/TA/T

21.09.22





its soft. the skin protects the seed. bulb has food the seed has water. ✓


Plants
petal
flower
leaf
stem
Seed
roots
deciduous tree
evergreen tree
Eddie's Garden
and How to Make Things Grow
Usborne Starting Point Science
WHAT MAKES A FLOWER GROW?
100 Number Square


Is it from a fox?
It has bones in.
Is it a herbivore, carnivore or omnivore?
I can see seeds.
It has grass in.
PIC•COLLAGE

Year 2

Living

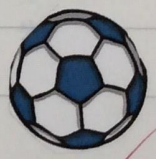
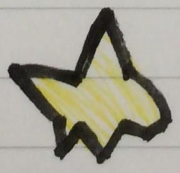



Dead



Never alive



14.9.2022

Fabulous!

You can identify living, dead and never alive.

T/TA/I

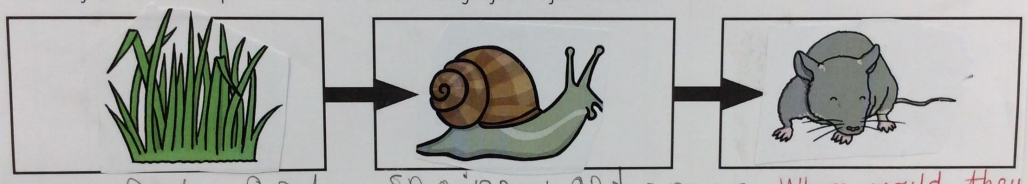


Food Chains

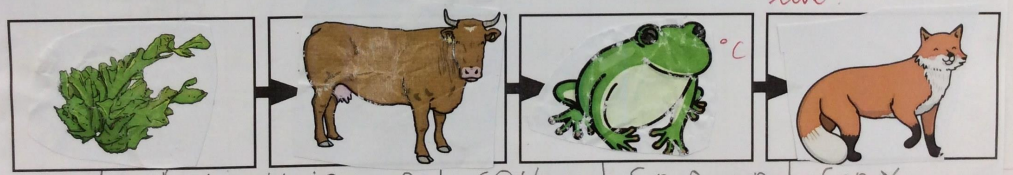
17.10.2022
Fabulous!
You can create a food chain.
T/TA/I

I can use a food chain to show how animals get their food.

Draw two food chains in the spaces below. Which habitat would you find this food chain in?



Habitat: rat and snail and grass Where would they live?



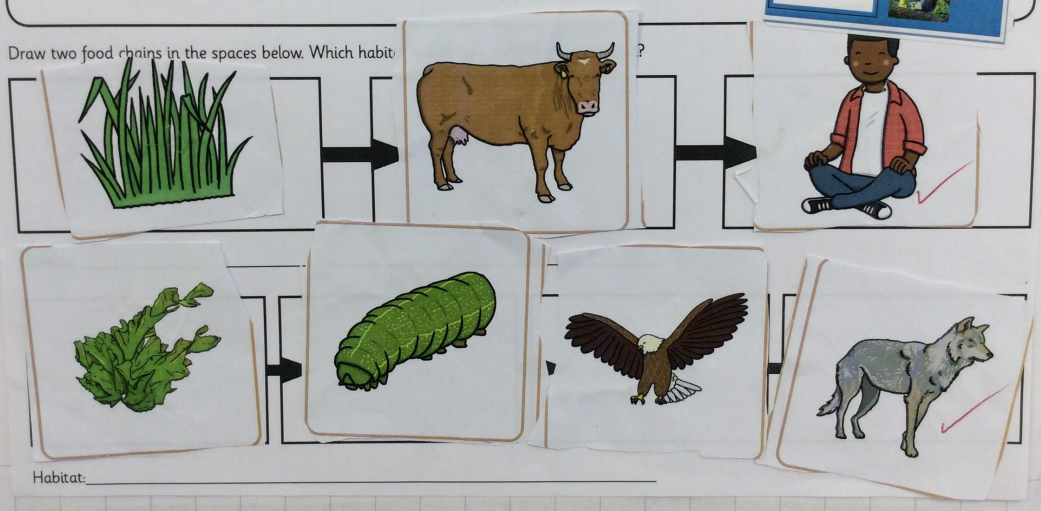
Habitat: lettletleflis and cowand frog and fonx

Food Chains

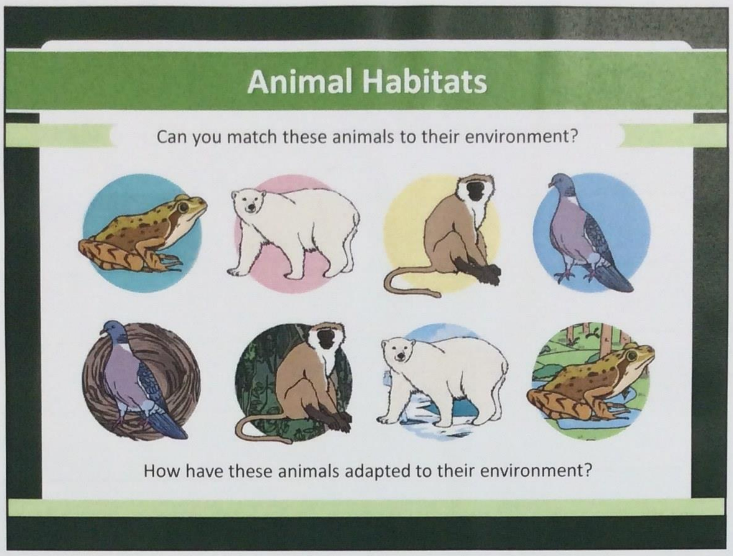
17.10.2022
Fabulous!
You can create a food chain.
T/TA/I

I can use a food chain to show how animals get their food.

Draw two food chains in the spaces below. Which habit ?



Habitat:



wednesday 5th october 2022

Frogs havea his brexr bee because thea: [they] feets flies and stic the ere tunet and catch the flis on the ~~flis~~. polarbears can cama florch in the Showand aees [ice] and eat Seelea and can smell for a way. theai jric werta just jric werta ins swimn. ✓

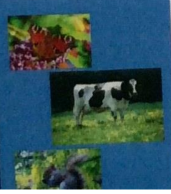
What else does a pond give frogs?

5.10.2022

Fabulous!

You can identify micro-habitats.

T/TA/I



Wednesday 5th october 2022

Habitat

Frogs live in a pond so they dowrnt get eatn. They have lilly pads because they need to keep ~~thear~~ their babby eggs safe. When the eggs hach they are tad poels then they turn into groglees then frogs. They like in a pond because they can drink water. Flies are mostley at the pond so the frogs can eat them. The poler beears like in the Arctic so they can stay

Wednesday 14 September 2022

Living

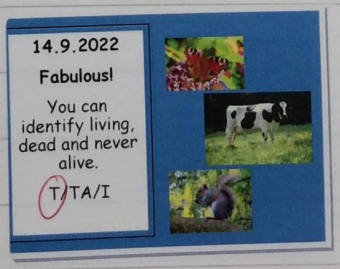
lion
plants
elephant
sun flour
trees ✓

Dead

fossil
sea
rubers
bush
pensle pencil ✓

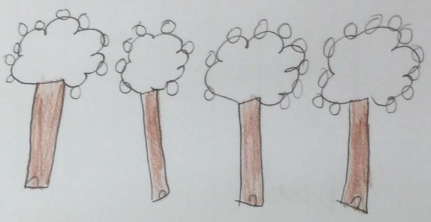
Never alive

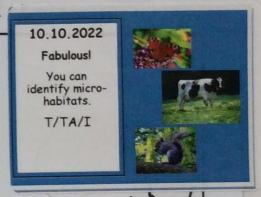
laptop
key
ball
Mountns
car ✓



Microhabitats

Draw and label the animals you found in the microhabitat you looked





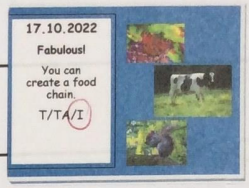
Why do these animals like to live here? because they is whols in the trees. It gives the ladybird shelter and food and some wear to raise thear babys. ✓

What other animals might live there? a heheog and a bunny and a squirll. ✓

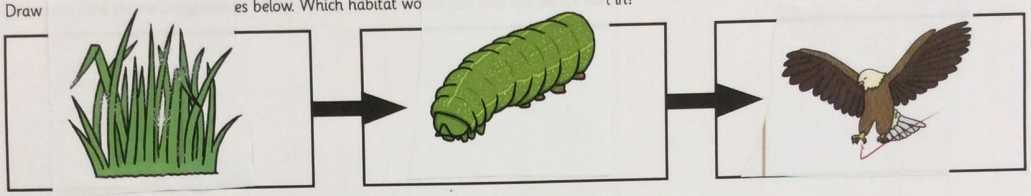
What could make this microhabitat change? maby if it was thundering and the thunder goes (goes) gose in the little whole and bits the andmals. /

Food Chains

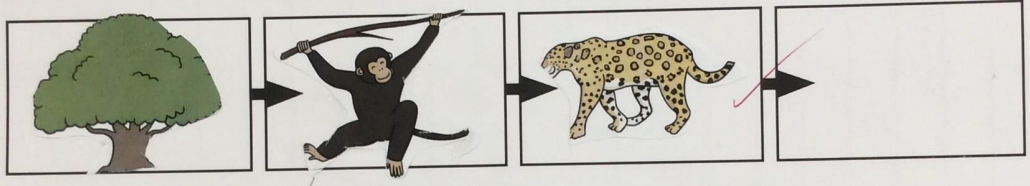
I can use a food chain to show how animals get their food.



Draw [illegible]es below. Which habitat wo[illegible]ı in?



Habitat: In a rainforest.



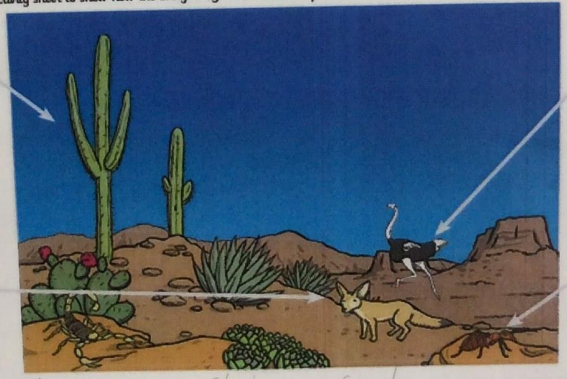
Habitat: In a jungle.

Dependency

I can say how living things in a habitat depend on each other.

All living things depend on one another- this means they need other living things to survive.
Cut out the labels and stick them on the activity sheet to show how the living things in the desert depend on each other, then complete the sentences below.

Plants provide food and water for animals.



Birds eat cactus fruits and spread seeds.

Desert foxes eat insects, birds and plants.

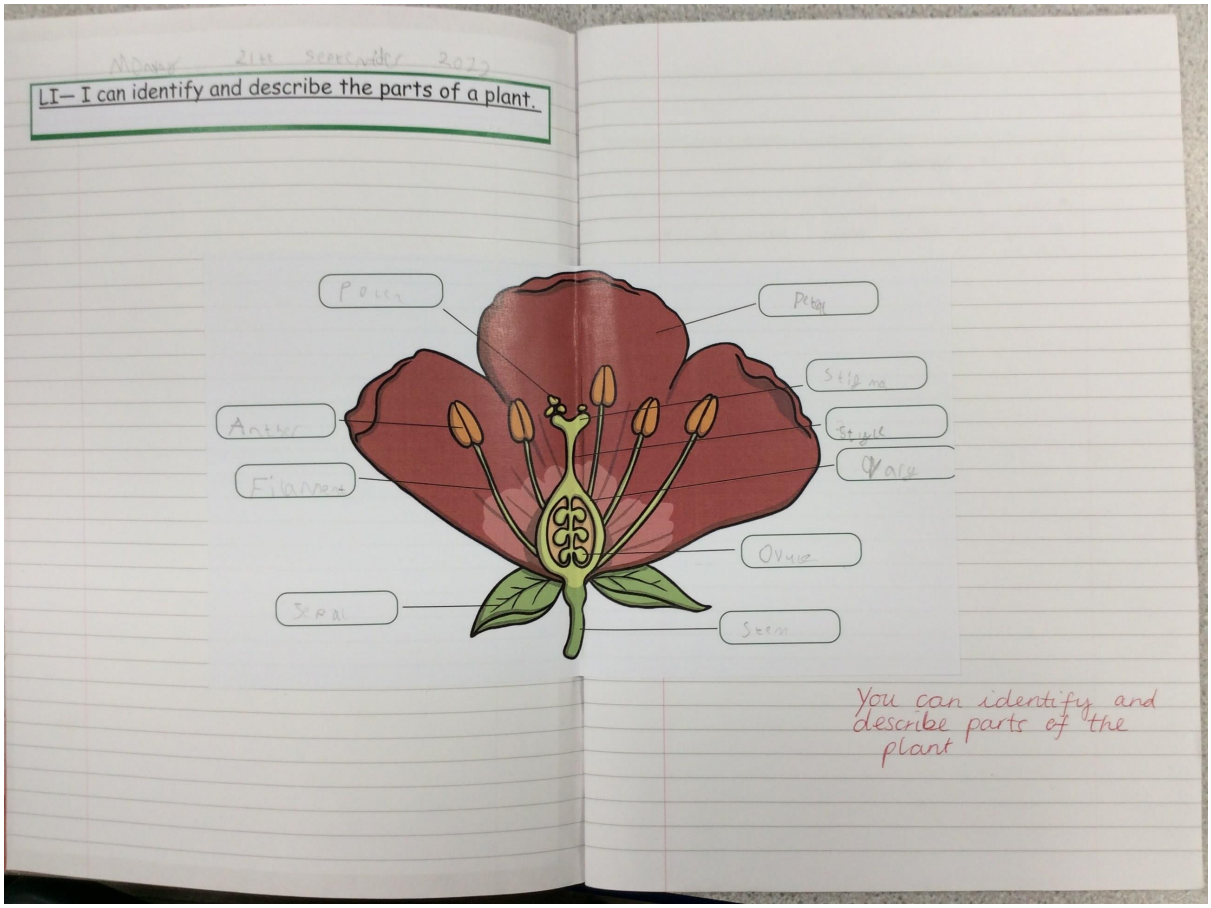
Insects eat the leaves, flowers and fruit.

Plants need animals to Spread seeds. Animals need plants for Shelter and food.

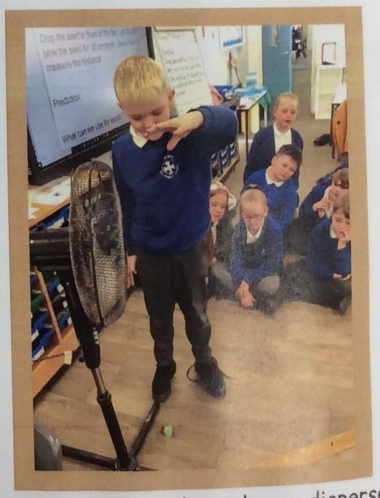
Some animals eat other animals.

Word Bank: **food, spread seeds, eat, shelter**

Year 3


LI– I can identify and describe the parts of a plant.
Petal
Anther
Filament
Ovule
Sepal
Stem
You can identify and describe parts of the plant

SEED DISPERSAL



We planned and carried out an investigation based on how different seeds are dispersed by wind. We choose different things within our class to represent different seeds. We tested them using the fan, which replicated the wind. We found that the lighter the seed, the further the wind was able to carry it. However, we did have some seeds that rolled further which shows shape may also impact.

Friday 14th October 2022

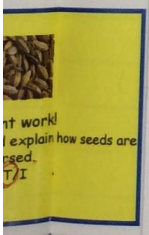
I can plan and carry out a investigation based on the process of seed dispersal.

Method

Drop the seed in front of the fan. Let the fan blow the seed for 10 seconds. Use a ruler to measure the distance.

My prediction

I predict the fan will make the seed go furthest because it is light and not very heavy.



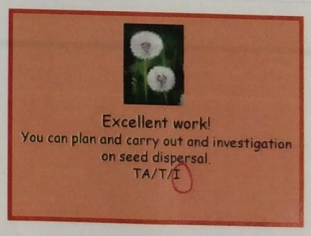


Table of results

Seed	Distance travelled
paper	50cm
seed	120cm
cube	0cm
Marble	70cm

I can describe and explain the way in which seed dispersal occurs.

The bird has eating and the seed has germinated. ✓
been excreting in it's t

The bees get atracted to the pr
Petals and get the pollen
~~to~~ out of the pollen honey

the wind disperses the seeds.

seed sticking to the lamb so the seed
can't grow and stuck to fur. ✓

The seed pod exploded's. ✓

Excellent wor
You can understand and explain ho
dispersed.
TA/TI

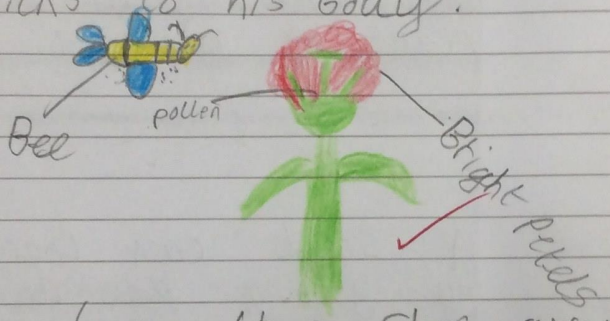
The coconuts are faleng outu
tree because the tree is geting
tired of the coconuts and
the coconuts want to fin
a new home. ✓

Transported by water

Friday 7th October

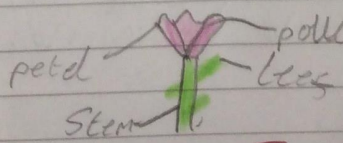
I can describe and explain what happens during the process of pollination.

The bees lands on the bright coloured petals to eat sweet smelling nectar. The poller rubs into the bee, as the stigma and sticks to his body.



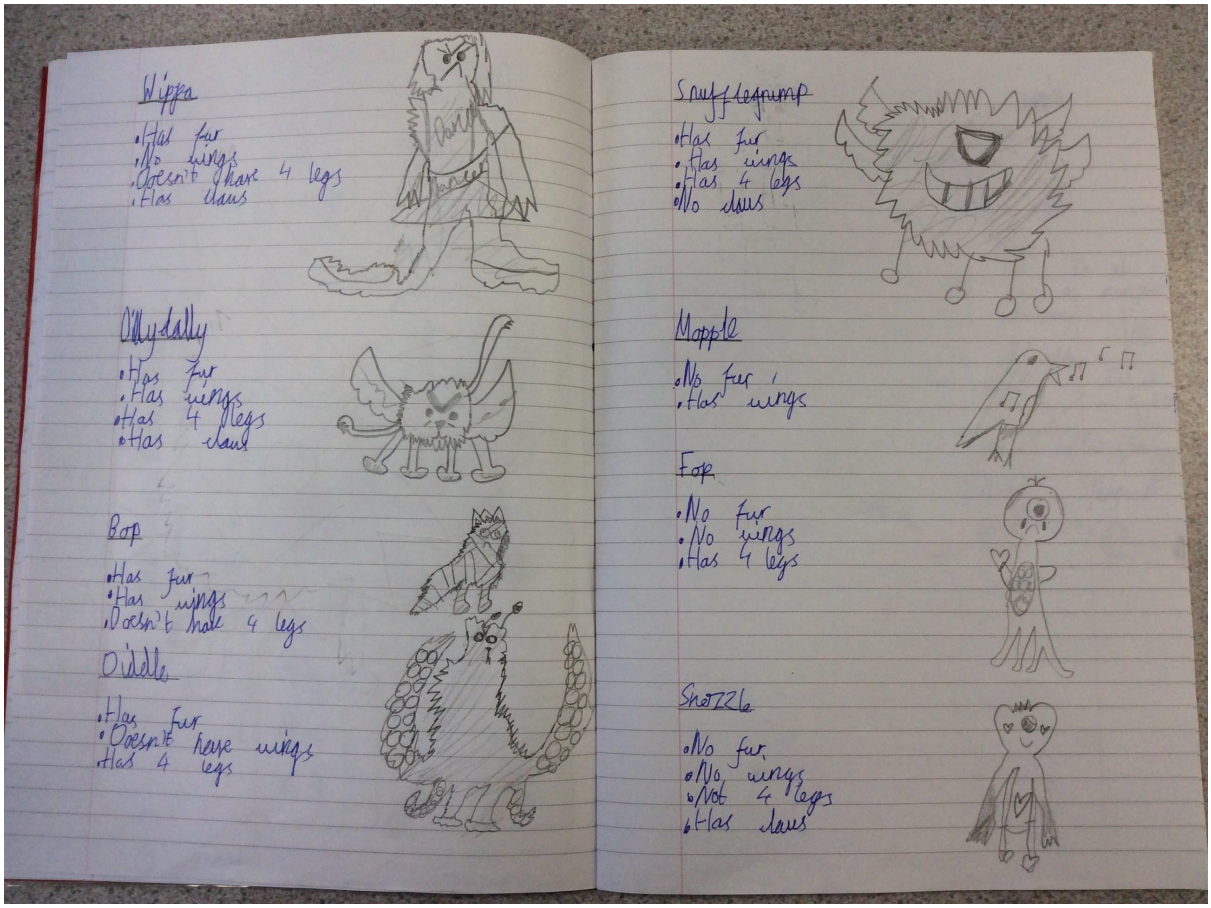
The bee then flies away when he is full of nectar. The poller is stuck to him still. He look sat another flower.

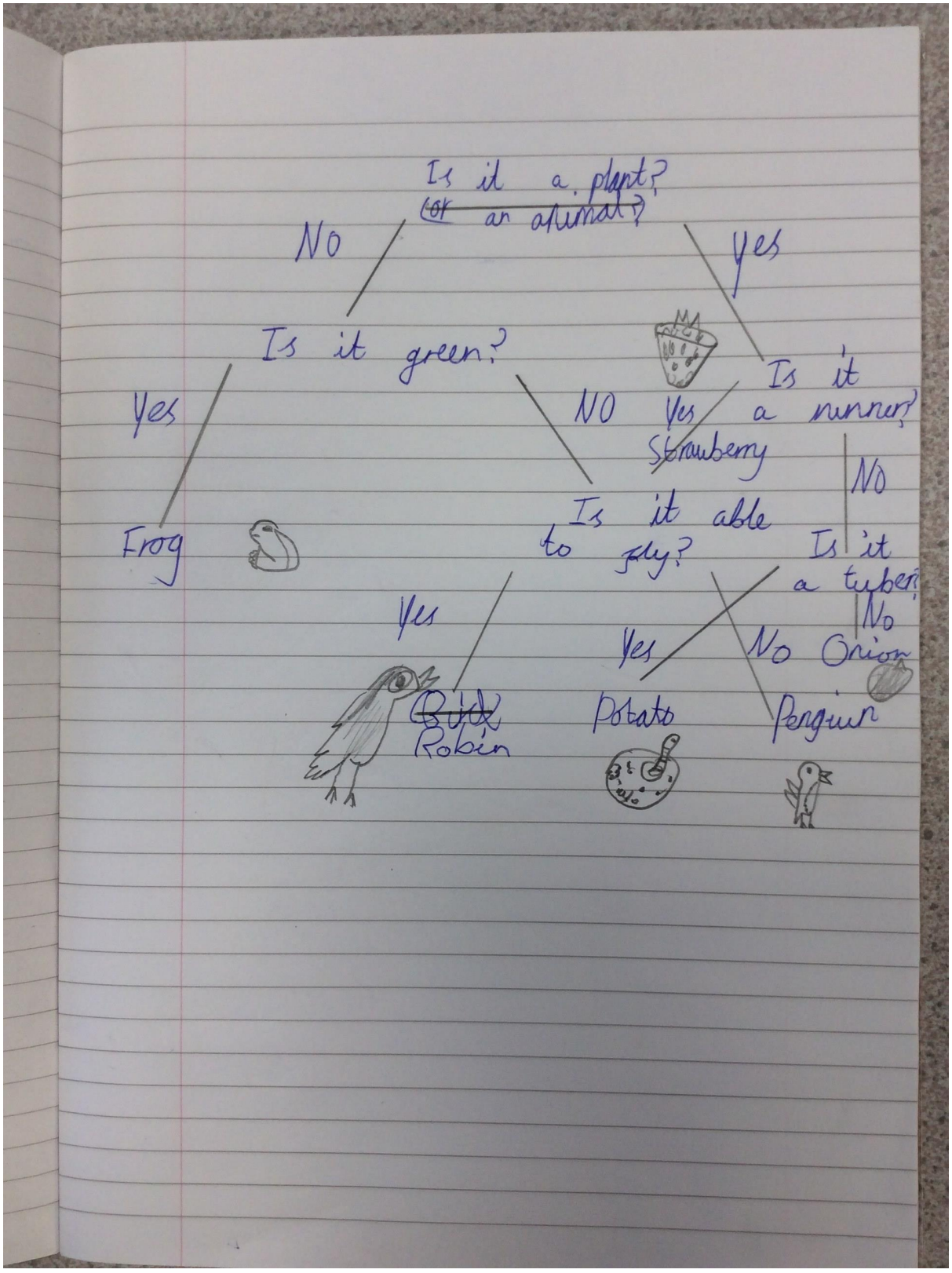
The bees with the poller stuck to him, then lands onto another flower and the poller rubs off him into the new plant stigma. This is called pollination.



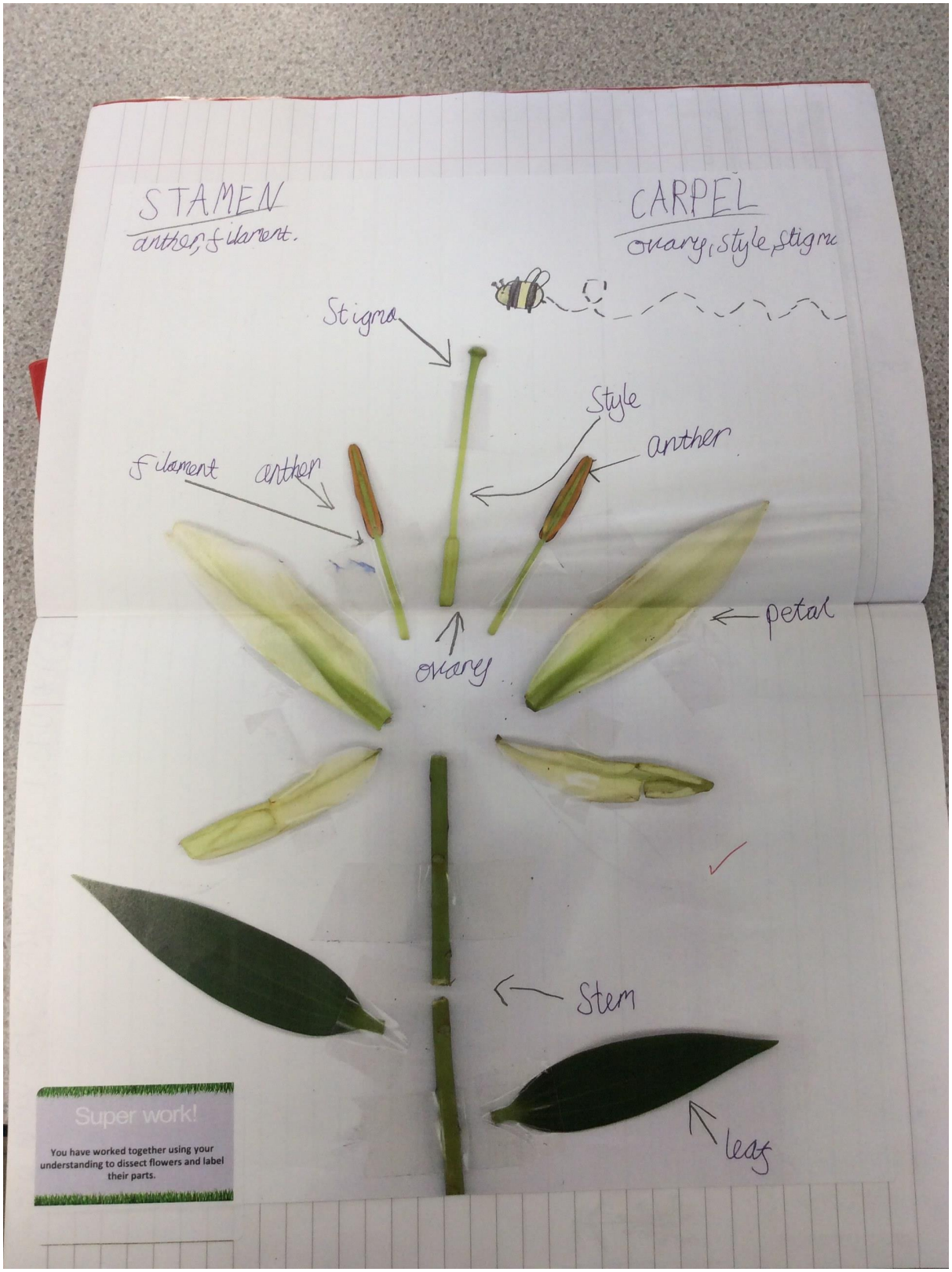
Excellent understanding of pollination Reuben!

Year 4

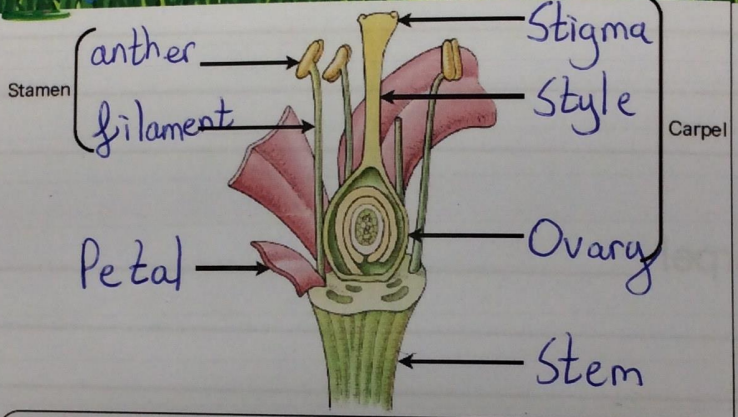

Wippa
•Has fur
•No wings
•Doesn't have 4 legs
•Has claws
Dilly dally
•Has fur
•Has wings
•Has 4 legs
•Has claws
Bop
•Has fur
•Has wings
•Doesn't have 4 legs
Diddle
•Has fur
•Doesn't have wings
•Has 4 legs
Snuffleguump
•Has fur
•Has wings
•Has 4 legs
•No claws
Mopple
•No fur
•Has wings
Fop
•No fur
•No wings
•Has 4 legs
Snozzle
•No fur
•No wings
•Not 4 legs
•Has claws


Is it a plant?
(or an animal?)
No
Yes
Is it green?
Yes
NO
Yes
Strawberry
Is it a runner?
Frog
Is it able to fly?
NO
Is it a tuber?
Yes
Yes
No
Robin
Potato
Penguin
Onion

Year 5


STAMEN
anther, filament.
CARPEL
ovary, style, stigma
Stigma
Style
anther
filament
anther
petal
ovary
Stem
leaf
Super work!
You have worked together using your understanding to dissect flowers and label their parts.

Wednesday 14th September 2022

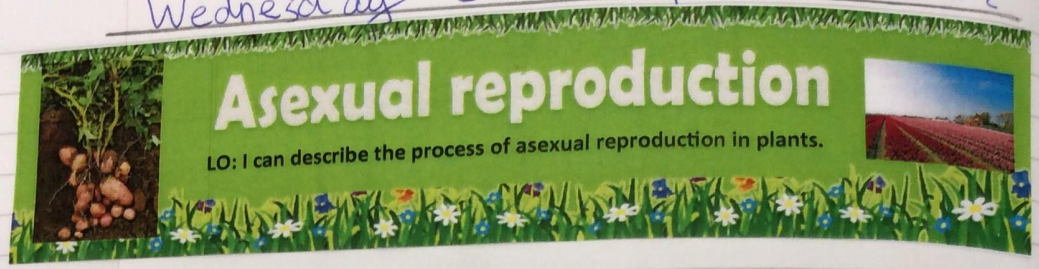


Word Bank

Petal Anther Style Filament

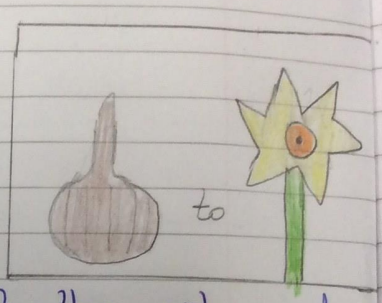
Stem Stigma Ovary

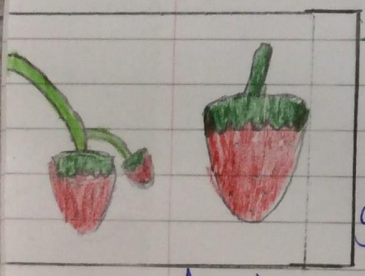
Wednesday 21st September 2022



Daffodil

How daffodil's repoduce? Small bulb shoots grow from the parent plant and makes a clone. The new bulb shoots out of the soil and forms a new flower.





Strawberry

Small shoots called runners grow from the stem of the parent plant. Along the runner start to grow and they grow into clones of there parents.

Asual reproduction is when a plant or animal can repoduce by themselves.

Next use what you have learnt to grow your own cloned plants from cuttings.

Sexual reproduction in animals

LO: I can describe the process of sexual reproduction in animals.

Look at the Animal Fact Cards. Can you design a Carroll diagram to sort them? What labels will your Carroll diagram have?

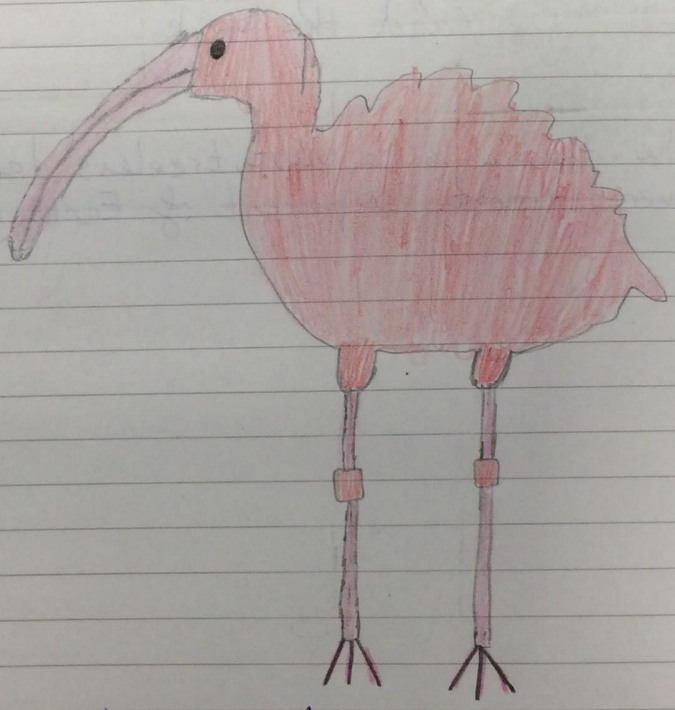
	Lays eggs	Does not lay eggs
Swim or flies to catch food	Atlantic puffin Red lionfish Northern Pike Green Hermit hummingbird	European otter
Does not swim or fly to catch food	Cape cobra ~~American black bear~~ Central bearded dragon	American black bear

Write some questions that can be answered by sorting animals using your Carroll diagram. Share them with someone else. Can they answer your questions?

Question 1 Which box has the most animals?	Answer The top left. ✓
Question 2 What does Green hermit hummingbird and the Atlantic puffin have in commen?	Answer They both fly, lay eggs and are birds. ✓
Question 3 What kind of animals are in the bottom left section?	Answer Animals that do not swim. and fly to catch food and lay eggs. ✓

Friday 30th September 2022

Scarlet ibis



The Scarlet ibis lives in the Caribbean near rivers. It has ~~(tano)~~ long thin legs for wading through the water. It has a long beak for catching shrimp (~~and~~ which ~~they~~ ~~the~~) have a chemical which turns their feathers bright red. The ibis is hunted by racoons, snakes and large cats. It's eggs crack in about 21 days

EURASIAN JAY

The Eurasian jay lives in woodlands in Europe, Northwest Africa and Asia. It's beak is small and hard as it's favorite food is acorns and other seeds. It also eats frui and berries. It's eggs hatch in around 17 days.

Wednesday 21st September 2022

Asexual reproduction

LO: I can describe the process of asexual reproduction in plants.

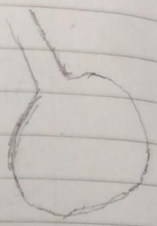
Great!

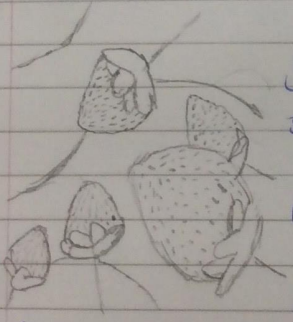
You have understood what asexual reproduction is. You have been able to explain some ways in which plants reproduce asexually.

Next use what you have learnt to grow your own cloned plants from cuttings.

Daffodil

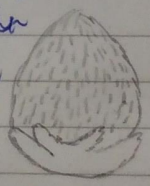
Daffodils are plants that are asexual. Meaning they reproduce without both male and female parts. Daffodils start out as small bulbs and then over time, some bulb shoots begins to grow out of the bottom. These begin to grow more bulbs that will shoot out once developed. Then, the flower grows a stem and becomes a daffodil after time. ✓





Strawberries shoot runners out of their leaves and stem. The runners go to grow plantlets from the bunners. ✓

Strawberry ✓



The plantlets grow roots and stems. Eventually, they will grow to be clone plants of the parent plant. ✓

Well done - good understanding.

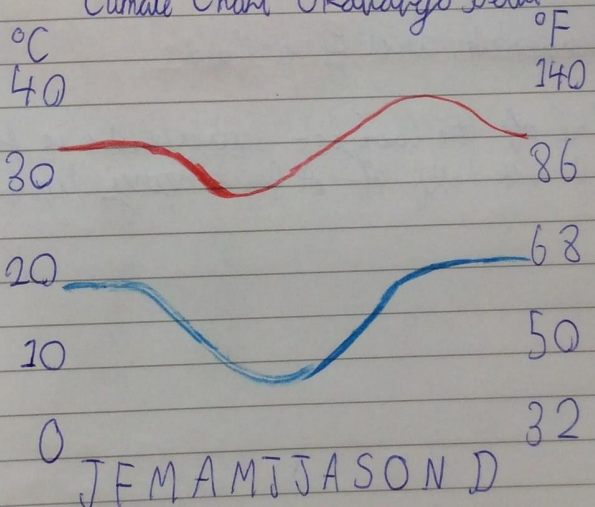
Asexual reproduction is when a plant or animal can reproduce by themselves. ✓

Wednesday 28th September 2022

Okavango Delta, Botswana

- American alligators and several species of snakes and sea turtles.
- Cheetahs, elephants, rhinos, lions and hippopotamus's live in the Inner Delta

Climate Chart Okavango Delta



- This may sound odd, but this delta is relatively young geologically speaking. It is only 60,000 years old.
- The Okavango Delta is one of the Seven Natural Wonders of Africa

Interesting facts.

Now news

Now in her 80s, Sylvia still actively works on her Mission Blue project and she still dives regularly!

She also is the founder of Deep Ocean Exploration and Research.

She is still National Geographic Explorer-in-Residence.

She works with Google Earth Ocean as well.

Back then

Earle was a research fellow at Harvard University

She has stayed underwater for over 7,000 hours scuba diving!

Sylvia's main research has involve ALGAE.

She also wrote several books warning people about the ongoing huge issues SEAS.

Ac

- 1970: U.S. Department of Interior Conservation Service Award and Los Angeles Woman of the Year.
- 1976: NOGI Award For Science
- 1980: Explorers Club Lowell Thomas Award
- 1981: Ordained as a Knight of the Order of the Golden Ark by Prince of the Netherlands.

Legacy

Sylvia Earle is best known for being an oceanographer and an award-winning lecturer and author, who became a National Geographic explorer-in-residence in 1998. She is also considered an expert on the impact of oil spills and has been called upon to lead several research teams during various spills.

Great research.

Year 6


mammal
Features:
• have hair or fur
• give birth to live young
Examples:
amphibian
Features:
• can live on land and in water
• develop lungs as
Examples:
they grow
newt
reptile
Features:
• scaly skin
• lay eggs on land
Examples:
snake
fish
Features:
• live underwater
• has fins and gills
Examples:
shark
bird
Features:
• feathers and beaks
• most can fly
Examples:
insect
Features:
• has up to six legs
• has one or two pairs of wings
Examples:
ladybird
mollusc
Features:
• soft unsegmented bodies
• hard outer shell
Examples:
crustacean
Features:
• has antennae
Examples:
echinoderm
Features:
• has spiny skin
• An invertebrate
Examples:
arachnid
Features:
• 8 legs
• front set of legs are sensory
Examples:
spider
annelid
Features:
• has no legs
• has a segmented body
Examples:
worm
myriapod
Features:
• has many legs
• has body segments
Examples:
centipede
Well done!
You can idenitfy the features of different organisms. You recognise the different features of the different animal groups and can use these when classifying
Next Steps: To describe and explain the features of different organisms.
Good classification of animals

Thursday 15th September 2022

Science

I can recap ways of grouping organisms according to their characteristics.

REPTILES

Different reptiles

There are many different types of reptiles such as: lizards, turtles, crocodiles, snakes and even dinosaurs. The most famous reptile and the ~~most~~ king of the reptiles is the komodo dragon (the worlds largest lizard). The ~~the~~ komodo dragon can nearly grow up to 10ft long and can weigh up to 300lbs or more.

Old reptiles

Reptiles are amongst the ~~the~~ longest-lived species on the planet. They can live ~~to~~ to very~~s~~ old ages. For example the Aldabra tortise can live to 150 years or older. Reptiles first appear in the fossil record 315 million years ago. Reptiles do not have sweat glands and thus are not slimy, instead their skin is usually cool and dry.

Fun Fact

Do you know that reptiles has a scientific name, which is reptilia

Deadliest reptiles

- Gila monster
- snapping turtles
- Mexican beaded lizard
- Iguanas
- Tree crocodile or crocodile monitor
- common or Malayan water monitor
- komodo dragon

Well done!
You can classify animals according to their characteristics. You recognise the different features of the different animal groups.

Next Steps: To explore ways of distinguishing between organisms.

Lovely work.

Wednesday 21st September 2022

Science

I can explore ways of distinguishing between organisms that have similar characteristics.

What do I know?

1. Reptiles ~~scientific~~ name is Reptilla.
2. Vertebrates have a back bone.
3. All mammals have fur

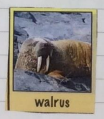
Classifying Animals

There are ~~of~~ other ways of ~~classifying~~ animals in their groups according to their ~~c~~ characteristics.

Classifying ~~animals~~ mammals

Aquatic


dolphin


walrus


killer whale


seal

Tropical


gorilla


tiger


monkey


orangutan


jaguar

Pet


rabbit


ferret


dog

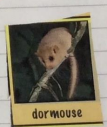

horse


cat

Forest


deer

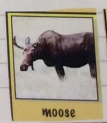

hare


dormouse


fox


brown bear


squirrel

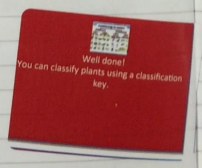

moose


wolf

Flowers

Flowering plants
hibiscus
sunflower
lavender
tulip
rose
hydrangea
blackberry bush
peach tree

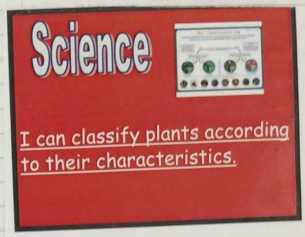
Excellent



non-flowering
Carrot
rosemary
onion
wheat

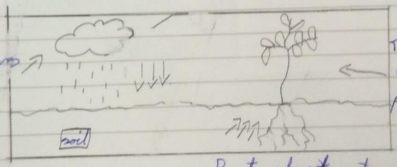
How did we classify the plants?
We looked at the group of plants and decided to seperate them in to two groups; edible - what could be eaten and plants that we could not eat (non-edible) secondly, we also looked again and created a further two groups; flowering plants - that produced flowers and plants that did not produce flowers; non-flowering.

Wednesday 28th September 2022



Bothrisks
A Botanista as is a scientist who studied plants. A botanist can sort plants into different groups by looking at there characteristics.

Vascular plants
These plants all have a system for transporting water and nutrions to differentparts of the plan. These plants all have a root and a stem.



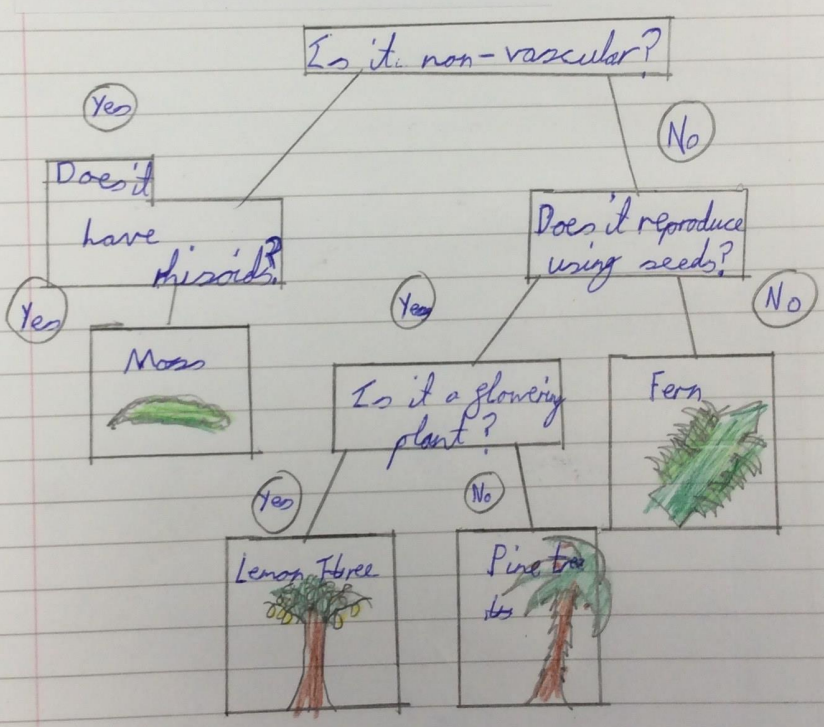
Roots absorb water from the soil.

Non-vascular plants
Non-vascular plants do not have roots or a stem. The plants have tiny hairs called rhizoids which latch on

Thursday 29th September 2022

Science

I can classify plants according to their characteristics.



Well done!
You can explain why plants belong to a certain group according to their characteristics.

Next Steps: To find out about Carl Linnaeus and his classification system.

Lovely work.

MICRO-ORGANISMS

WHAT ARE MICRO-ORGANISMS?

Micro-organisms are organisms all around us that we cannot see and they are living things. They include bacteria, fungi and viruses.

WHAT DO MICRO-ORGANISMS LOOK LIKE?

HOW ARE MICRO-ORGANISMS GROUPED?

Micro-organisms are grouped by protists, fungi and bacteria.

HOW CAN MICRO-ORGANISMS BE HELPFUL?

As they can be good for you and they can produce food.

HOW CAN MICRO-ORGANISMS BE HARMFUL?

As they can make mould on food that can make you really ill.

Well done!

Fantastic!
You have identified what a micro-organism is and how they are grouped.

Next Steps: to plan and investigate the impact of a microorganism on different foods.

Thursday 13th October 2022

Science

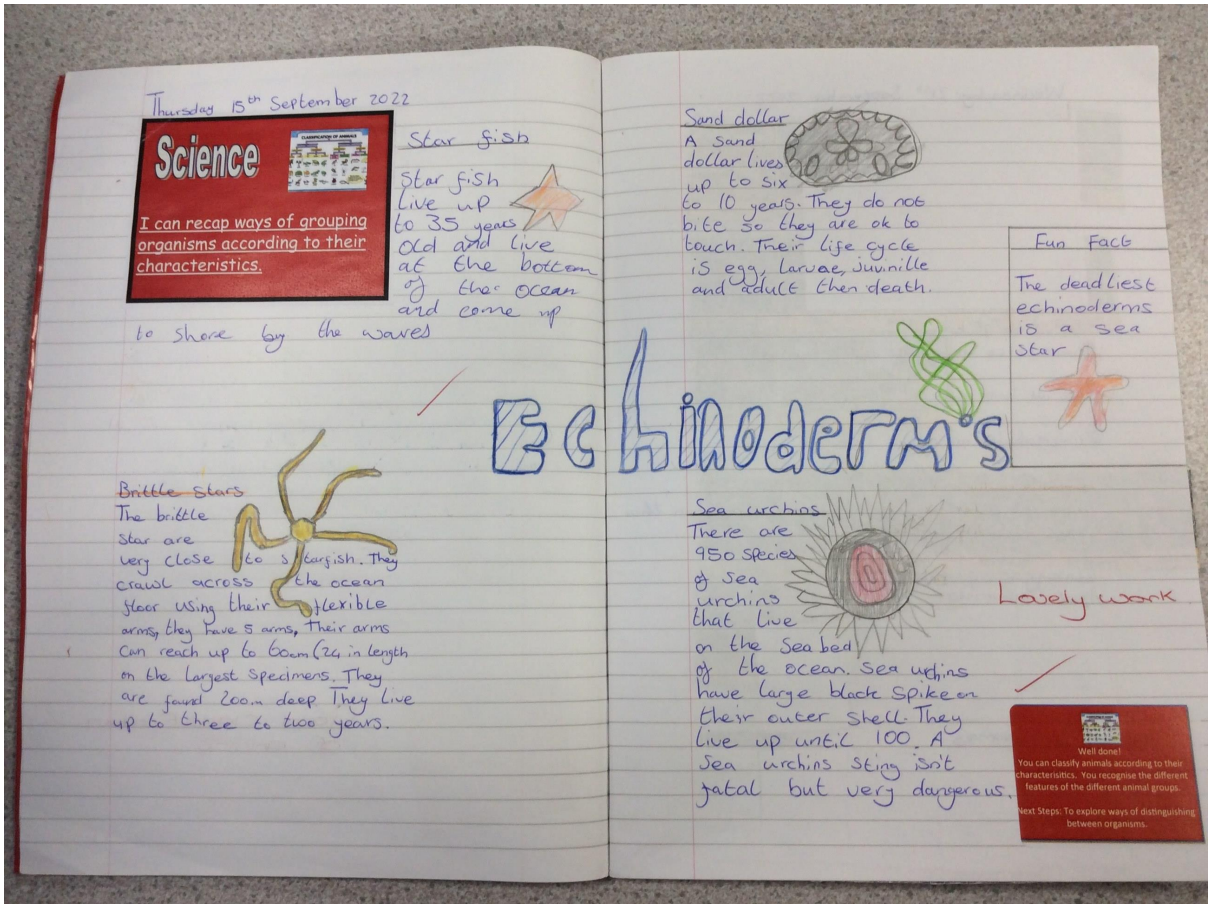
I can explore what micro-organisms are and how they can be grouped.

An investigation to find out the effect of yeast on different food products

You will need
- 6 plastic cups
- water
- measuring jug
- 4 sachets of yeast
- 4 ziplock food bags
- 20g of salt
- 20g of sugar
- 20g of rice
- 20g of oil
- 20g of flour

Method
1. First pour 200 ml of water into 4 plastic cups. Then add 1 sache of yeast into each cup

2. After that measure out 20g of each of the food products to test: sugar, salt, rice and oil. Add a label to each of the zip lock bags so

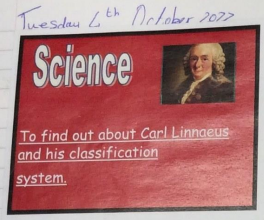


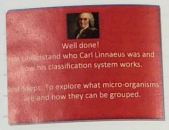
Raising aspirations

At St John Bosco we believe children should be opened up to the world of work. It shows children what careers are out there and the skills they'll need to leave a positive footprint wherever they go in life. It's also about building their self-belief, their resilience, recognising their qualities and how they could be used in the workplace. Showing them that they can achieve anything if they set their mind to it.

In science we aim to introduce a career or a famous scientist within every topic so that pupils can link their learning to the outside world and become more motivated to learn the skills and knowledge needed.

Tuesday 6th October 2020





power of three — Excellent understanding of Carl Linnaeus

1. Vascular plants have roots.
2. Non-Vascular plants dont have roots.
3. Cherry and lemon trees are flowering plants.

Carl Linnaes

Carl Linnaes was born in 1707 in Sweden. He is known as the father of taxonomy. Taxonomy is the science of identifying, naming and classifying orginisms. Linnaes is famous for developing a system for classifying orginisms and this is the basis for how we classify orginisms today.

Early Life

From a young age, Linnaes loved plants and animals. His father taught him plant names that were in latin and very hard to say. When he got older he travelled to different places to collect different species of plants.

His achievments

Linnaes created a system to make it easier to identify orginisms. His "Systema Naturae" was first published in 1735. This was an eleven pay booklet that outlined his system for classification. Throughout his career he added more orginisms to his system so that he had eventually created two large books.

How does the system work?

The system involves splitting orginisms into groups according to their features. The first step was splitting them into kingdom which were plants, animals and minerals. Next these were split into orders, then into general (genus) and then into species.

Kingdom → Order → Genus → species

He also came up with a new way of naming orginisms. He limited the name to two names. The first part of the name was Genus and the second part was the species.

Legacy

Lots of other scientists began using Linneas system and soon it became a universal way of classifying and naming orginisms. Now scientists all over the world have a common name for orginisms.

...lia Jakubiec

Thursday 13th October 2022

SIR DAVID FREDERICK ATTENBOROUGH

Early life.

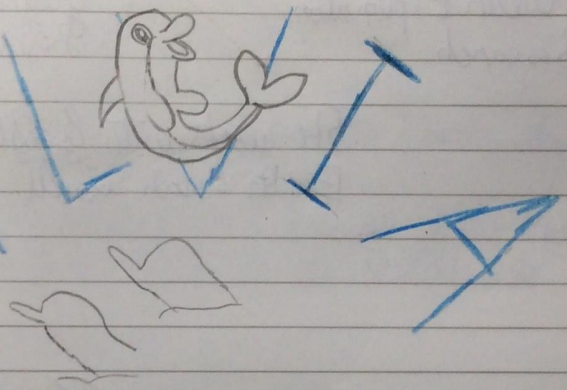
David Attenborough was born in Isleworth, West London, in 1926, but grew up in Leicester the same year to the ~~(queen)~~ Queen. He was the second of three boys born to Frederick Attenborough. and his wife Mary. Alongside his brothers Richard and John David's parents also took in two Jewish refugee girls during World War II, Irene and Helga. David became fascinated by natural history in his early childhood. In fact, by the age of seven – after been inspired by his Dad – he had already created his very own "museum" of bird eggs, old stamps and ancient fossils.

Thursday 13th October 2022

Naturalists

LO: I can find out about the work of naturalists.

SYLVIA

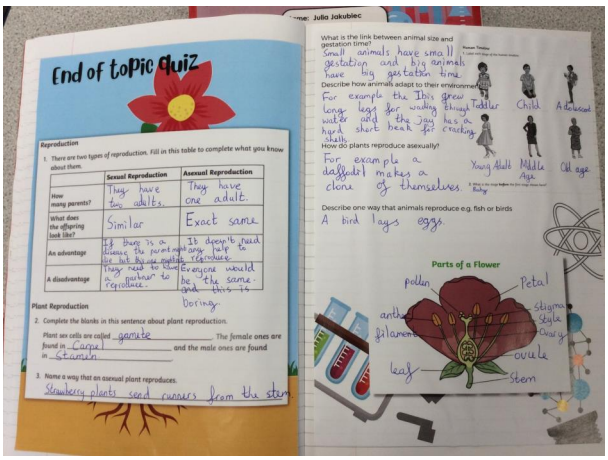


Simple facts!

Born in: August 30, 1935, Gibbstown, New Jersey
Full Name: Sylvia Alice Reade/Earle
Occupations: Marine biologist, oceanographer, explorer
Education: Florida State University
Parents: Lewis Reade Earle, Alice Freas Richie.

EARLE

Assessment



Formative assessment:

- Spending time before and during each unit eliciting children's knowledge and understanding of topics.
- Quality questioning.
- Self-assessment and peer assessment against learning intentions.
- Quality marking to identify next steps.

Summative assessment

- At the end of each unit all children will complete a quiz.
- Class teachers will use their professional judgement to determine whether each child is working at expected, working towards or working at greater depth.
- Termly data is inputted into the school's tracking system. This can be used to produce end of year targets throughout KS1 and KS2.

What is working well? Even better if...?

Pupil Voice

- 'I really enjoy doing experiments in school. It makes me feel like a real scientist.' Y 4
- 'In the future I would like to study science at university, so learning as much as I can in school will really help me reach my goals.' Y6
- 'Science is so fun. I love seeing how seeds can change.' Y1

Staff Voice:

- Children are engaged and excited about science.

- Children are able to transfer their scientific skills across the curriculum.
- Children are more engaged because they are able to link their knowledge and skills to the real world and future career opportunities.

Actions

- Increase children's understanding of scientific skills.
- Science visitors/days (whole school science day during science week 10-19th March).
- Parental involvement.

Action plan- Autumn Term

ST. JOHN BOSCO RC PRIMARY SCHOOL
Curriculum Plan Autumn 2022
Science

September	October	November	December
STAFF			
Share progression of skills/knowledge document with staff again before the year begins.		Planning/book trawl ensuring progress across school. Feedback to be given.	Staff meeting- Science update
GOVERNORS			
		Update link governor	.
PUPILS			
Science lessons commence.	Pupil Voice- What do you like about science? Would you like to go into a science career when you are older?		
PARENTS/CARERS			
Curriculum maps shared with parents via website. Updates from class shared with parents via Twitter (across the year).	Parents Evening- progress and future targets discussed.		

Science club

Events/Visitors

Anything Else