

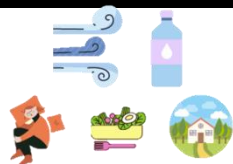
Science Key Knowledge & Skills Overview

KS1 & KS2 Y1	Topic 1	TOPIC 2	TOPIC 3	TOPIC 4
	Seasonal changes – this will be ongoing throughout the year	Materials	Plants	Animals including Humans
	 Knowledge There are four seasons: spring, summer, autumn and winter. Certain events and weather patterns happen in different seasons. Day length (the number of daylight hours) is longer in the summer months and shorter in the winter months. Different types of weather. The weather can change daily and some weather types are more common in certain seasons, such as snow in winter. Skills Observe and describe how day length changes across the year. Observe changes across the four seasons. Asking simple questions and recognising that they can be answered in different ways. With support, gather and record simple data in a range of ways (data tables and diagrams). Performing simple tests. Gathering and recording data to help in answering questions. Key Vocabulary axis, herbaceous plant, horizon, orbit, temperature, thermometer, compass, shadow	 Knowledge A material is what an object is made from. Everyday materials include wood, plastic, glass, metal, water, rock, brick, paper and fabric. Materials have different properties, such as hard or soft; stretchy or stiff; rough or smooth; opaque or transparent; bendy or rigid; waterproof or not waterproof. Materials can be grouped according to their properties. Skills Identify and name what an object is made from, including wood, plastic, glass, metal, water and rock. Compare and group materials in a variety of ways, such as based on their physical properties; being natural or man-made. Investigate and describe the simple physical properties of some everyday materials. Asking simple questions and recognising that they can be answered in different ways. With support, gather and record simple data in a range of ways. Performing simple comparative tests. Key Vocabulary absorbent, bendy, material, foil, prediction, translucent, transparent, opaque, flexible, waterproof	 Knowledge The basic plant parts include root, stem, leaf, flower, petal, fruit, seed and bulb. Trees have a woody stem called a trunk. Plants are living things. Common plants include the daisy, daffodil and grass. Trees are large, woody plants and are either evergreen or deciduous. Trees that lose their leaves in the autumn are called deciduous trees. Examples include oak, beech and rowan. Trees that shed old leaves and grow new leaves all year round are called evergreen trees. Examples include holly and pine. Skills Label and describe the basic structure of a variety of common plants. Identify, compare, group and classify a variety of common wild and garden plants, including deciduous and evergreen trees, based on observable features. Asking simple questions and recognising that they can be answered in different ways. Performing simple comparative tests. Key Vocabulary moss, conifer, fern, evergreen, deciduous, root, stem, flower, leaf, blossom, petals, fruit, seed, bulb, trunk, branches	 Knowledge Different animal groups have some common body parts, such as eyes and a mouth, and some different body parts, such as fins or wings. Carnivores eat other animals (meat), herbivores eat plants and omnivores eat other animals and plants. Animals are living things. Animals can be sorted and grouped into six main groups: fish, amphibians, reptiles, birds, invertebrates and mammals. The basic body parts are the head, arms, legs, nose, eyes, ears, mouth, hands and feet. The five senses are hearing, sight, smell, taste and touch. Skills Label and describe the basic structures of a variety of common animals, including fish, amphibians, reptiles, birds and mammals. Identify, compare, group and sort a variety of common animals based on observable features. Group and sort a variety of common animals based on the foods they eat. Draw and label the main parts of the human body and say which body part is associated with which sense. Key Vocabulary fish, amphibians, birds, reptiles, mammals, omnivores, carnivores, herbivores

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TOPIC 1

Animals including Humans

Knowledge

Animals have offspring that grow into adults. Different animals have different stages of growth or life cycles.

Human offspring go through different stages as they grow to become adults. These include baby, toddler, child, teenager, adult and elderly.

Animals need water, food, air and shelter to survive. Their habitat must provide all these things.

A healthy lifestyle includes exercise, good personal hygiene, good quality sleep and a balanced diet. Risks associated with an unhealthy lifestyle include obesity, tooth decay and mental health problems.

Skills

Describe the basic life cycles of some familiar animals (egg, caterpillar, pupa, butterfly; egg, chick, chicken; spawn, tadpole, froglet, frog).

Describe the stages of human development (baby, toddler, child, teenager, adult and elderly).

Describe what humans need to survive.

Explain how animals, including humans, need water, food, air and shelter to survive.

Describe the importance of a healthy lifestyle, including exercise, a balanced diet, good quality sleep and personal hygiene.

TOPIC 2

Everyday Materials

Knowledge

A material's physical properties make it suitable for particular purposes, such as glass for windows and brick for building walls. Many materials are used for more than one purpose, such as metal for cutlery and cars.

Some objects and materials can be changed by squashing, bending, twisting, stretching, heating, cooling, mixing and being left to decay.

Skills

Compare the suitability of a range of everyday materials for particular uses, including wood, metal, plastic, glass, brick, rock, paper and cardboard

Describe how some objects and materials can be changed and how these changes can be desirable or undesirable.

Compare how things move on different surfaces.

Follow a set of instructions to perform a range of simple tests, making simple predictions for what might happen and suggesting ways to answer their questions.

Observe objects, materials, living things and changes over time, sorting and grouping them based on their features and explaining their reasoning.

Ask and answer scientific questions about the world around them.

Use a range of methods to gather and record simple data with some accuracy.

TOPIC 3

Plants

Knowledge

Plants grow from seeds and bulbs. Seeds and bulbs need water and warmth to start growing (germinate). As the plant grows bigger, it develops leaves and flowers.

Plants need water, light and a suitable temperature to grow and stay healthy. Without any one of these things, they will die.

Skills

Observe and describe how seeds and bulbs change over time as they grow into mature plants.

Describe how plants need water, light and a suitable temperature to grow and stay healthy.

Follow a set of instructions to perform a range of simple tests, making simple predictions for what might happen and suggesting ways to answer their questions.

Observe objects, materials, living things and changes over time, sorting and grouping them based on their features and explaining their reasoning.

Use simple equipment to measure and make observations.

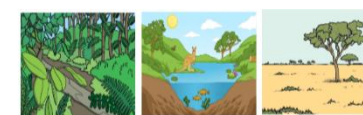
Ask and answer scientific questions about the world around them.

Use a range of methods to gather and record simple data with some accuracy.

Using their observations and ideas to suggest answers to questions.

TOPIC 4

Living Things and Their Habitats

Knowledge

Living things are those that are alive. Dead things are those that were once living but are no longer. Some things have never been alive.

Local habitats include parks, woodland and gardens. Habitats beyond the locality include beaches, rainforests, deserts, oceans and mountains. All living things live in a habitat to which they are suited and it must provide everything they need to survive.

A habitat is a place where a living thing lives. A microhabitat is a very small habitat.

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.

Food chains show how living things depend on one another for food. All food chains start with a plant, followed by animals that either eat the plant or other animals.

Skills

Compare and group things that are living, dead or have never been alive.

Describe a range of local habitats and habitats beyond their locality (beaches, rainforests, deserts, oceans and mountains) and what all habitats provide for the things that live there.

Identify and name a variety of plants and animals in a range of habitats and microhabitats.

Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.

Follow a set of instructions to perform a range of simple tests, making simple predictions for what might happen and suggesting ways to answer their questions.

Ask and answer scientific questions about the world around them.

Use a range of methods (tables, charts, diagrams and Venn diagrams) to gather and record simple data with some accuracy.

Key Vocabulary

carbohydrates, extinct, life cycle, life span, minerals, protein

Key Vocabulary

As Year 1, with names of materials + flexible, rigid, reflective, non-reflective.

Key Vocabulary

bud, bulb, germination, seed, greenhouse, temperature, probe, thermometer, tuber

Interpret and construct simple food chains to describe how living things depend on each other as a source of food.

Observe objects, materials, living things and changes over time, sorting and grouping them based on their features and explaining their reasoning.

Follow a set of instructions to perform a range of simple tests, making simple predictions for what might happen and suggesting ways to answer their questions.

Ask and answer scientific questions about the world around them.

Use a range of methods to gather and record simple data with some accuracy.

Key Vocabulary

Living, dead, never been alive, basic needs, food, food chain, habitats, microhabitat

TOPIC 1

Rocks

**Knowledge**

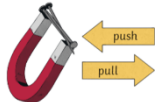
Soils are made from tiny pieces of eroded rock, air and organic matter. There are a variety of naturally occurring soils, including clay, sand and silt. Different areas have different soil types.

There are three different rock types: sedimentary, igneous and metamorphic. Sedimentary rocks form from mud, sand and particles that have been squashed together over a long time to form rock. Examples include sandstone and limestone. Igneous rocks are made from cooled magma or lava. They usually contain visible crystals. Examples include pumice and granite. Metamorphic rocks are formed when existing rocks are heated by the magma under the Earth's crust or squashed by the movement of the Earth's tectonic plates. They are usually very hard. Examples include slate and marble.

Fossils form over millions of years and are the remains of a once-living organism, preserved as rock. Scientists can use fossils to find out what life on Earth was like in prehistoric times. Fossils form when a living thing dies in a watery environment. The body gets covered by mud and sand and the soft tissues rot away. Over time, the ground hardens to form sedimentary rock and the skeletal or shell remains turn to rock.

TOPIC 2

Forces and Magnets

**Knowledge**

Friction is a force between two surfaces as they move over each other. Friction slows down a moving object. Smooth surfaces usually generate less friction than rough surfaces.

An object will not move unless a pushing or pulling force is applied. Some forces require direct contact, whereas other forces can act at a distance, such as magnetic force.

Some magnets attract or repel each other and attract some materials and not others.

Some materials have magnetic properties. Magnetic materials are attracted to magnets. All magnetic materials are metals but not all metals are magnetic. Iron is a magnetic metal.

Magnets have two poles (north and south). Opposite poles (north and south) attract each other, while like poles (north and north, or south and south) repel each other.

Skills

Compare and group materials based on their magnetic properties.

Compare how objects move over surfaces made from different materials.

TOPIC 3

Light

**Knowledge**

Dark is the absence of light and we need light to be able to see.

Light can be reflected from different surfaces. Some surfaces are poor reflectors, such as some fabrics, while other surfaces are good reflectors, such as mirrors.

Light from the Sun is damaging for vision and the skin. Protection from the Sun includes sun cream, sun hats, sunglasses and staying indoors or in the shade.

A shadow is formed when light from a light source, such as the Sun, is blocked by an object. Opaque objects cast dark shadows. Translucent objects cast pale shadows. Transparent objects cast very pale shadows.

Shadows change shape and size when the light source moves. For example, when the light source is high above the object, the shadow is short and when the light source is low down, the object's shadow is long.

Skills

Explain why light from the Sun can be dangerous.

Explain, using words and diagrams,

TOPIC 4

Animals including Humans

**Knowledge**

Animals cannot make their own food and need to get nutrition from the food they eat. Carnivores get their nutrition from eating other animals. Herbivores get their nutrition from plants. Omnivores get their nutrition from eating a combination of both plants and other animals.

Humans have a skeleton and muscles for movement, support and protecting organs. Major bones in the human body include the skull, ribs, spine, humerus, ulna, radius, pelvis, femur, tibia and fibula. Major muscle groups in the human body include the biceps, triceps, abdominals, trapezius, gluteals, hamstrings, quadriceps, deltoids, gastrocnemius, latissimus dorsi and pectorals.

Skills

Compare and contrast the diets of different animals.

Ask questions about the world around them and explain that they can be answered in different ways.

Setting up simple practical enquiries, comparative and fair tests

Gathering, recording, classifying and

Topic 5

Plants

**Knowledge**

Flowers are important in the life cycle of flowering plants. The processes of a plant's life cycle include germination, flower production, pollination, seed formation and seed dispersal. Insects and the wind can transfer pollen from one plant to another (pollination). Animals, wind, water and explosions can disperse seeds away from the parent plant (seed dispersal).

Water is transported in plants from the roots, through the stem and to the leaves, through tiny tubes called xylem. (moved)

Plants need air, light, water, minerals from the soil and room to grow, in order to survive. Different plants have different needs depending on their habitat. Examples include cacti, which need less water than is typical, and ferns, which can grow in lower light levels.

The plant's roots anchor the plant in the ground and transport water and minerals from the ground to the plant. The stem (or trunk) support the plant above the ground. The leaves collect energy from the Sun and make food for the plant. Flowers make seeds to produce new plants.

Skills

Draw and label the life cycle of a flowering plant.

	Recognise that soils are made from rocks and organic matter. Skills Investigate soils from the local environment, making comparisons and identifying features. Describe simply how fossils are formed, using words, pictures or a model. Compare and group rocks based on their appearance, properties or uses. Ask questions about the world around them and explain that they can be answered in different ways. Gather and record findings in a variety of ways (classification key) with increasing accuracy. Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions Use suitable vocabulary to talk or write about what they have done, what the purpose was and, with help, draw a simple conclusion based on evidence collected, beginning to identify next steps or improvements. Key Vocabulary arthropod, humus, igneous, metamorphic, sedimentary	Investigate and compare a range of magnets (bar, horseshoe and floating) and explain that magnets have two poles (north and south) and that opposite poles attract each other, while like poles repel each other. Explain that an object will not move unless a push or pull force is applied, describing forces in action and whether the force requires direct contact or whether the force can act at a distance (magnetic force) Ask questions about the world around them and explain that they can be answered in different ways. Set up and carry out some simple, comparative and fair tests, making predictions for what might happen. Equipment is used to take measurements in standard units - strength magnet is measured by a forcemeter g and ruler cm. Gather and record findings in a variety of ways (tables, diagrams, bar charts) with increasing accuracy. Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. Use suitable vocabulary to talk or write about what they have done, what the purpose was and, with help, draw a simple conclusion based on evidence collected, beginning to identify next steps or improvements. Key Vocabulary forces, friction, magnetic, non-magnetic, magnetic north pole, magnetic south pole, sliding friction	how shadows are formed when a light source is blocked by an opaque object. Describe the differences between dark and light and how we need light to be able to see. Group and sort materials as being reflective or non-reflective - table. Find patterns in the way shadows change during the day. Ask questions about the world around them and explain that they can be answered in different ways. Gather and record findings in a variety of ways (diagrams, tables) with increasing accuracy. Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions Use suitable vocabulary to talk or write about what they have done, what the purpose was and, with help, draw a simple conclusion based on evidence collected, beginning to identify next steps or improvements. Identifying differences, similarities or changes related to simple scientific ideas and processes. Key Vocabulary concave mirror, convex mirror, image, light beam, light ray, reflected ray, reflection, shadow	presenting data in a variety of ways to help in answering questions. Gather and record findings in a variety of ways (labelled diagrams, tables) with increasing accuracy. Use suitable vocabulary to talk or write about what they have done, what the purpose was and, with help, draw a simple conclusion based on evidence collected, beginning to identify next steps or improvements. Using straightforward scientific evidence to answer questions or to support their findings. Key Vocabulary arthropod, balanced diet, carbohydrates, fats, herbivore, invertebrate, minerals, muscle, omnivore, protein, tendons, unbalanced diet, vertebrate, vitamins	Investigate how water is transported within plants. Describe the requirements of plants for life and growth (air, light, water, nutrients and room to grow) and how they vary from plant to plant. Name and describe the functions of the different parts of flowering plants (roots, stem, leaves and flowers). Ask questions about the world around them and explain that they can be answered in different ways. Setting up simple practical enquiries, comparative and fair tests. Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables. Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. Use suitable vocabulary to talk or write about what they have done, what the purpose was and, with help, draw a simple conclusion based on evidence collected, beginning to identify next steps or improvements. Key Vocabulary extinct, flower, fruit, nectar, ovary, ovule, petal, pollen, seed, stigma, seed dispersal
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TOPIC 1

States of Matter

Knowledge

Materials can be grouped according to whether they are solids, liquids or gases. Solids stay in one place and can be held. Some solids can be squashed, bent, twisted and stretched. Liquids move around (flow) easily and are difficult to hold. Liquids take the shape of the container in which they are held. Gases spread out to fill the available space and cannot be held.

Particles make up all materials. The particles are close together and arranged in a regular pattern in a solid. In a liquid, the particles are close together but arranged randomly. In a gas, the particles are randomly arranged and far apart.

Heating or cooling materials can bring about a change of state. This change of state can be reversible or irreversible. The temperature at which materials change state varies depending on the material. Water changes state from solid (ice) $\rightleftharpoons$ liquid (water) at 0°C and from liquid (water) $\rightleftharpoons$ gas (water vapour) at 100°C . The process of changing from a solid to liquid is called melting. The reverse process of changing from a liquid to a solid is called freezing. The process of changing from a liquid to a gas is called evaporation. The reverse process of changing from a gas to a liquid is called condensation.

The temperature when a solid begins to melt is called its melting point. The temperature when a liquid begins to freeze is called its freezing point. The temperature when a liquid begins to evaporate is called its boiling point. The temperature when a gas begins to condense is called its condensing point.

TOPIC 2

Animals including Humans

Knowledge

There are four different types of teeth: incisors, canines, premolars and molars. Incisors are used for cutting. Canines are used for tearing. Premolars and molars are used for grinding and chewing. Carnivores, herbivores and omnivores have characteristic types of teeth. Herbivores have many large molars for grinding plant material. Carnivores have large canines for killing their prey and tearing meat.

The digestive system is responsible for digesting food and absorbing nutrients and water. The main parts of the digestive system are the mouth, oesophagus, stomach, small intestines, large intestines and rectum. The mouth starts digestion by chewing food and mixing it with saliva. The oesophagus transports the chewed food to the stomach, where it mixes with stomach acid and gets broken down into smaller pieces. In the small intestine, nutrients from the food are absorbed by the body. In the large intestine, water is absorbed by the body. The remaining undigested waste is stored in the rectum before excretion through the anus.

Regular teeth brushing, limiting sugary foods and visiting the

TOPIC 3

Electricity

Knowledge

Electricity is a type of energy. It is used to power many everyday items, such as kettles, computers and televisions. Electricity can also come from batteries. Batteries eventually run out of power and need to be recycled or recharged. Batteries power devices that can be carried around, such as mobile phones and torches.

Electricity is essential to our daily lives and makes peoples' lives easier. Electricity comes from two sources, mains and batteries.

A series circuit is a simple loop with only one path for the electricity to flow. A series circuit must be a complete loop to work and have a source of power from a battery or cell.

A series circuit has a single path for an electric current to flow through.

Electrical components include cells, wires, lamps, motors, switches and buzzers.

A circuit is a collection of components connected by wires through which an electric current can flow. A circuit must be a complete loop to work.

Switches open and close a circuit and provide control.

Electrical conductors allow electricity to flow through them, whereas insulators do not. Common electrical conductors are metals. Common insulators include wood, glass, plastic and rubber.

TOPIC 4

Sound

Knowledge

When an instrument is played, the air around or inside it vibrates. These vibrations travel as a sound wave.

Sound waves travel through a medium, such as air or water, to the ear.

Volume is how loud or quiet a sound is. The harder an instrument is hit, plucked or blown, the stronger the vibrations and the louder the sound.

Recognise that sounds get fainter as the distance from the sound source increases - Sounds are louder closer to the sound source and fainter as the distance from the sound source increases.

Skills

Compare and find patterns in the volume of a sound, using a range of equipment, such as musical instruments.

Find patterns between the pitch of a sound and features of the object that produced it.

Explain how sounds are made and heard using diagrams, models, written methods or verbally.

Topic 5

Living Things and their Habitats

Knowledge

Scientists classify living things according to shared characteristics. Animals can be divided into six main groups: mammals, reptiles, amphibians, birds, fish and invertebrates. These groups can be further subdivided.

Classification keys are scientific tools that aid the identification of living things.

Recognise that environments can change and that this can sometimes pose dangers to living things - Habitats change over time, either due to natural or human influences. Natural influences include extreme or unseasonable weather. Human influences include habitat destruction or pollution. These changes can pose a risk to animals and plants that live in the habitat.

Skills

Compare, sort and group living things from a range of environments, in a variety of ways, based on observable features and behaviour.

Explain how unfamiliar habitats, such as a mountain

Temperature is a measure of how hot or cold something is. It is measured in degrees using an instrument called a thermometer. In the United Kingdom, temperature is measured in degrees Celsius.

Skills

Group and sort materials into solids, liquids or gases.

Observe and explain that some materials change state when they are heated or cooled and measure or research the temperature in degrees Celsius ($^{\circ}\text{C}$) at which materials change state.

Take accurate measurements in standard units, using a range of equipment.

Gather, record, classify and present observations and measurements in a variety of ways (pictorial representations, timelines, diagrams, keys, tables, charts and graphs).

Use scientific vocabulary to report and answer questions about their findings based on evidence collected, draw simple conclusions and identify next steps, improvements and further questions.

Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.

Begin to choose which observations to make and for how long and make systematic, careful observations and comparisons, identifying changes and connections.

Identifying differences, similarities or changes related to simple scientific ideas and processes.

Key Vocabulary

condensation, data logger, evaporation, condensation, precipitation, collection, freezing point, boiling point, gas, liquid, solid, temperature, thermometer, water cycle

dentist are important for good oral hygiene.

Food chains show what animals eat within a habitat and how energy is passed on over time. All food chains start with a producer, which is typically a green plant. The producer is eaten by a primary consumer (prey), which is eaten by a secondary consumer (prey), which is eaten by a tertiary consumer. Changes within a food chain, such as an abundance or lack of one food type, have an impact on the entire food chain.

Skills

Identify the four different types of teeth in humans and other animals, and describe their functions

Construct and interpret a variety of food chains, identifying producers, predators and prey.

Use scientific vocabulary to report and answer questions about their findings based on evidence collected, draw simple conclusions and identify next steps, improvements and further questions.

Gather, record, classify and present observations and measurements in a variety of ways (pictorial representations, timelines, diagrams, keys, tables, charts and graphs).

Key Vocabulary

anus, canines, digestion, incisors, large intestine, molars, oesophagus, predator, premolars, prey, rectum, small intestine, stomach, tongue

Working with electrical circuits can be dangerous. Precautions include not touching electrical components with wet hands and not putting batteries in mouths.

Skills

Compare common household equipment and appliances that are and are not powered by electricity.

Construct operational simple series circuits using a range of components and switches for control.

Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery.

Recognise some common conductors and insulators, and associate metals with being good conductors.

Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit

Predict and describe whether a circuit will work based on whether or not the circuit is a complete loop and has a battery or cell.

Begin to choose which observations to make and for how long and make systematic, careful observations and comparisons, identifying changes and connections.

Data can be recorded and displayed in different ways, including tables, charts, graphs, keys and labelled diagrams.

Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusion

Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions

Key Vocabulary

Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit,

Compare how the volume of a sound changes at different distances from the source.

Begin to independently plan, set up and carry out a range of comparative and fair tests, making predictions and following a method accurately.

Begin to choose which observations to make and for how long and make systematic, careful observations and comparisons, identifying changes and connections.

Begin to independently plan, set up and carry out a range of comparative and fair tests, making predictions and following a method accurately.

Data can be recorded and displayed in different ways, including tables, charts, graphs, keys and labelled diagrams.

Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables

Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusion

Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions

Key Vocabulary

Ear protectors, frequency, fret, finger board, guiro, percussion instrument, pitch, sound wave, stringed instrument, tines, tuning fork, vibration, wind instrument.

or ocean, can change over time and what influences these changes

Construct and interpret a variety of food chains and webs to show interdependence and how energy is passed on over time.

Key Vocabulary

Classification, classification keys, environment, habitat, food chain, human impact, positive, negative

component, cell, battery, positive, negative, conductor, insulator

Y5

TOPIC 1

Forces



Knowledge

Gravity is a force of attraction. Anything with a mass can exert a gravitational pull on another object. The Earth's large mass exerts a gravitational pull on all objects on Earth, making dropped objects fall to the ground.

Friction, air resistance and water resistance are forces that oppose motion and slow down moving objects. These forces can be useful, such as bike brakes and parachutes, but sometimes we need to minimise their effects, such as streamlining boats and planes to move through water or air more easily, and using lubricants and ball bearings between two surfaces to reduce friction.

Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.

Skills

Explain that objects fall to Earth due to the force of gravity.

Compare and describe, using a range of toys, models and natural objects, the effects of water resistance, air resistance and friction.

Describe and demonstrate how simple levers, gears and pulleys assist the movement of objects.

TOPIC 2

Earth and Space



Knowledge

Describe the movement of the Earth, and other planets, relative to the Sun in the solar system - make lesson

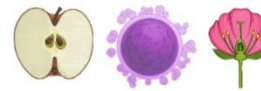
The Moon orbits Earth, completing a full orbit every month (28 days).

The Sun, Earth, Moon and the planets in our solar system are roughly spherical. All planets are spherical because their mass is so large that they have their own force of gravity. This force of gravity pulls all of a planet's material towards its centre, which compresses it into the most compact shape - a sphere.

As Earth orbits the Sun, it also spins on its axis. It takes Earth a day (24 hours) to complete a full spin. During the day, the Sun appears to move through the sky. However, this is due to the Earth rotating and not the Sun moving. Earth rotates to the east or, if viewed from above the North Pole, it rotates anti-clockwise, which means the Sun rises in the east and sets in the west. As Earth rotates, different parts of it face the Sun, which brings what we call daytime. The part facing away is in shadow, which is night time.

TOPIC 3

Living Things and Their Habitats



Knowledge

A life cycle is the series of changes in the life of a living thing and includes these basic stages: birth, growth, reproduction and death. Mammals' life cycles include the stages: embryo, juvenile, adolescent and adult. Amphibians' life cycles include the stages: egg, larva (tadpole), adolescent and adult. Some insects' (butterflies, beetles and bees) life cycles include the stages: egg, larva, pupa and adult. Birds' life cycles include the stages: egg, baby, adolescent and adult.

Flowering plants reproduce sexually. The flower is essential for sexual reproduction. Other plants reproduce asexually. Bulbs, corms and rhizomes are some parts used in asexual reproduction in plants. Reproduction is the process of producing offspring and is essential for the continued survival of a species. There are two types of reproduction: sexual and asexual. Sexual reproduction involves two parents (one female and one male) and produces

TOPIC 4

Animals including Humans



Knowledge

Humans go through characteristic stages as they develop towards old age. These stages include baby, infant, toddler, child, adolescent, young adult, adult and senior citizen. Puberty is the transition between childhood and adulthood.

Skills

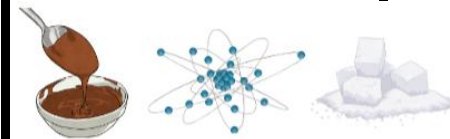
Describe the changes as humans develop to old age.

Plan and carry out a range of enquiries, including writing methods, identifying variables and making predictions based on prior knowledge and understanding.

Use relevant scientific vocabulary to report on their findings, answer questions and justify their conclusions based on evidence collected, identify improvements, further questions and predictions.

TOPIC 5

Materials



Knowledge

Materials can be grouped according to their basic physical properties. Properties include hardness, solubility, transparency, conductivity (electrical and thermal) and magnetism. Thermal conductors conduct heat. Solid metals are good thermal conductors because their particles are closely packed and they have strong, lattice metallic bonds. Solids, such as plastic, wood and glass do not have these bonds so they do not conduct heat. They are thermal insulators. Liquids and gases are poor conductors of heat because their particles are further apart.

Some materials (solutes) will dissolve in liquid (solvents) to form a solution. The solute can be recovered by evaporating off the solvent by heating. Solubility is a measure of a material's ability to dissolve in a solvent. A material is soluble if it can dissolve in a solvent to form a solution. A material is insoluble if it cannot be dissolved in a solvent to form a solution. Dissolving is when a solute becomes incorporated into a solvent and can no longer be seen.

Plan and carry out a range of enquiries, including writing methods, identifying variables and making predictions based on prior knowledge and understanding.

Take increasingly accurate measurements in standard units, using a range of chosen equipment.

Use relevant scientific vocabulary to report on their findings, answer questions and justify their conclusions based on evidence collected, identify improvements, further questions and predictions.

Identifying scientific evidence that has been used to support or refute ideas or arguments.

Key Vocabulary

acceleration, air resistance, element, force meter, gravity, newton, sliding friction, static friction, streamlined, water resistance, weight

Skills

Describe the movement of the Earth, and other planets, relative to the Sun in the solar system

Describe or model the movement of the Moon relative to Earth.

Describe the Sun, Earth and Moon as approximately spherical bodies and use this knowledge to understand the phases of the Moon and eclipses.

Use the idea of Earth's rotation to explain day and night, and the Sun's apparent movement across the sky.

Key Vocabulary

Earth, Sun, Moon, Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune, astronomer, axis, constellation, eclipse, element, galaxy, moon, orbit, planet, space probe, star, universe.

offspring that are different from the parents. Asexual reproduction involves one parent and produces offspring that is identical to the parent.

Parts of a flower include the stamen, filament, anther, pollen, carpel, stigma, style, ovary, ovule and sepal. Pollination is when the male part of a plant (pollen) is carried, by wind, insects or other animals, to the female part of the plant (carpel). The pollen travels to the ovary, where it fertilises the ovules (eggs). Seeds are then produced, which disperse far away from the parent plant and grow new plants.

Skills

Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.

Group and sort plants by how they reproduce. Describe the life process of reproduction in some plants and animals.

Label and draw the parts of a flower involved in sexual reproduction in plants (stamen, filament, anther, pollen, carpel, stigma, style, ovary, ovule and sepal).

Plan and carry out a range of enquiries, including writing methods, identifying variables and making predictions based on prior knowledge and understanding.

Key Vocabulary

anther, cell, external fertilisation, embryo, fruit,

Key Vocabulary

anomalous result, brain, gestation period, hormone, nerves, organ

A material's properties dictate what it can be used for. For example, cooking pans are made from metal, which is a good thermal conductor, allowing heat to quickly transfer from the hob to the contents of the pan.

Some mixtures can be separated by filtering, sieving and evaporating. Sieving can be used to separate large solids from liquids and some solids from other solids. Filtering can be used to separate small solids from liquids. Evaporating can be used to separate dissolved solids from liquids.

Reversible changes include heating, cooling, melting, dissolving and evaporating. Irreversible changes include burning, rusting, decaying and chemical reactions.

A mixture is a combination of two or more substances that aren't chemically joined and can be separated back into their individual substances. Heterogeneous mixtures consist of distinctly different substances and are easy to separate. Substances in homogeneous mixtures are evenly distributed and you cannot see the different parts. Homogeneous mixtures are difficult to separate. Irreversible changes are usually accompanied by one or more of these signs: a gas is produced; light is produced; a smell is produced or the smell changes; the colour changes; sound is produced, or the temperature changes.

Skills

Compare and group everyday materials by their properties, including hardness, solubility,

			internal fertilisation, life cycle, life span, ovary, ovule		transparency, conductivity (electrical and thermal) and magnetism. Explain, following observation, that some substances (solutes) will dissolve in liquid (solvents) to form a solution and the solute can be recovered by evaporating off the solvent. Describe, using evidence from comparative or fair tests, why a material has been chosen for a specific use, including metals, wood and glass. Separate mixtures by filtering, sieving and evaporating. Identify, demonstrate and compare reversible and irreversible changes. Plan and carry out a range of enquiries, including writing methods, identifying variables and making predictions based on prior knowledge and understanding. Take increasingly accurate measurements in standard units, using a range of chosen equipment. Gather and record data and results of increasing complexity, selecting from a range of methods. Use relevant scientific vocabulary to report on their findings, answer questions and justify their conclusions based on evidence collected, identify improvements, further questions and predictions. <u>Key Vocabulary</u> Dissolve, filter, insoluble, irreversible change, melt, molecule, particle, reversible
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TOPIC 1

Light

**Knowledge**

Lasers are intense beams of light and they should never be pointed at people's faces or aircraft.

Light travels in straight lines.

Light travels in waves in straight lines. Light waves in diagrams are drawn as straight lines with arrowheads that show the direction of travel. The angle at which light hits a reflective surface is the same angle at which it is reflected.

Light sources give out light. They can be natural or artificial. When light hits an object, it is absorbed, scattered, reflected or a combination of all three.

Mirrors and lenses are used in a range of everyday objects (telescopes, periscopes, cards and on roads). The human eye has a lens that bends and focuses light on the back of the eye (retina) so that we can see.

Visible light is made up of coloured light that when mixed makes white light.

A shadow appears when an object blocks the passage of light. Apart from some distortion or fuzziness at the edges, shadows are the same shape as the object. The distortion or fuzziness depends on the position or type of light source.

Skills

Identify that light travels in straight lines.

TOPIC 2

Electricity

**Knowledge**

There are recognised symbols for different components of circuits.

A circuit needs a power source, such as a battery or cell, with wires connected to both the positive and negative terminals. Other components include lamps, buzzers or motors, which an electric current passes through and affects a response, such as lighting a lamp or turning a motor. When a switch is open, it creates a gap and the current cannot travel around the circuit. When a switch is closed, it completes the circuit and allows a current to flow all the way around it.

An electric current is the flow of electric charge around a circuit. The electric current flows from the cell through all the components and back to the cell.

Voltage is measured in volts (V) and is a measure of the difference in electrical energy between two parts of a circuit. The bigger the voltage, the more electrons are pushed through the circuit. The more voltage flowing through a lamp, buzzer or motor, the brighter the lamp, the louder the buzzer and the faster the motor.

Skills

Compare and give reasons for variations in

TOPIC 3

Living Things and their Habitats

**Knowledge**

Classification keys help us identify living things based on their physical characteristics.

Scientists classify living organisms into broad groups according to their characteristics. Vertebrates are an example of a classification group. There are a number of ranks, or levels, within the biological classification system. The first rank is called a kingdom, the second a phylum, then class, order, family, genus and species.

Living things are classified into groups, according to common observable characteristics and based on similarities and differences.

Skills

Ask and answer deeper and broader scientific questions about the local and wider world that build on and extend their own and others' experiences and knowledge.

Choose an appropriate approach to recording accurate results,

TOPIC 4

Animals including Humans

**Knowledge**

The circulatory system includes the heart, blood vessels and blood. The heart pumps blood through the blood vessels and around the body. There are three types of blood vessel: arteries, veins and capillaries. They each have a different-sized hole (lumen) and walls. The blood carries gases (oxygen and carbon dioxide), water and nutrients to where they are needed. The red blood cells carry oxygen and carbon dioxide around the body. The blood also contains white blood cells, which protect the body from infection.

The role of the circulatory system is to transport oxygen, water and nutrients around the body. They are transported in blood and delivered to where they are needed.

Lifestyle choices can have a positive (exercise and eating healthily) or negative (drugs, smoking and alcohol) impact on the body.

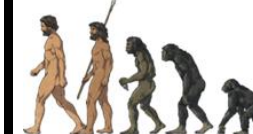
Skills

Name and describe the purpose of the circulatory system and the functions of the heart, blood vessels and blood.

Explain that the circulatory system in

TOPIC 5

Evolution and Adaptation

**Knowledge**

Animals that sexually reproduce generate new offspring of the same kind by combining the genetic material of two individuals. Each offspring inherits two of every gene, one from the female parent and one from the male parent.

Animals and plants can be bred to produce offspring with specific and desired characteristics. This is called selective breeding. Examples include cows that produce large quantities of milk or crops that are disease-resistant.

An adaptation is a physical or behavioural trait that allows a living thing to survive and fill an ecological niche. Adaptations evolve by natural selection. Favourable traits help an organism survive and pass on their genes to subsequent generations.

	Explain that, due to how light travels, we can see things because they give out or reflect light into the eye. Explain, using words, diagrams or a model, why shadows have the same shape as the objects that cast them and how shadows can be changed. Describe, using diagrams, how light behaves when reflected off a mirror. Ask and answer deeper and broader scientific questions about the local and wider world that build on and extend their own and others' experiences and knowledge. Plan and carry out a range of enquiries, including writing methods, identifying and controlling variables, deciding on equipment and data to collect and making predictions based on prior knowledge and understanding. Independently decide which observations to make, when and for how long and make systematic and careful observations, using them to make comparisons, identify changes, classify and make links between cause and effect. Take accurate, precise and repeated measurements in standard units, using a range of chosen equipment. Report on and validate their findings, answer questions and justify their methods, opinions and conclusions, and use their results to suggest improvements to their methodology, separate facts from opinions, pose further questions and make predictions for what they might observe. Choose an appropriate approach to recording accurate results, including scientific diagrams, labels, timelines, classification keys, tables, models and graphs (bar, line and scatter), linking to mathematical knowledge. Key Vocabulary	how components in electrical circuits function (brightness of lamps; volume of buzzers and function of on or off switches). Explain how the brightness of a lamp or volume of a buzzer is affected by the number and voltage of cells used in a circuit. Report on and validate their findings, answer questions and justify their methods, opinions and conclusions, and use their results to suggest improvements to their methodology, separate facts from opinions, pose further questions and make predictions for what they might observe. Take accurate, precise and repeated measurements in standard units, using a range of chosen equipment. Ask and answer deeper and broader scientific questions about the local and wider world that build on and extend their own and others' experiences and knowledge. Plan and carry out a range of enquiries, including writing methods, identifying and controlling variables, deciding on equipment and data to collect and making predictions based on prior knowledge and understanding. Choose an appropriate approach to recording accurate results, including scientific diagrams, labels, timelines, classification keys, tables, models and graphs (bar, line and scatter), linking to mathematical knowledge. Independently decide which observations to make, when and for how long and make systematic and careful observations, using them to make comparisons, identify changes, classify and make links between cause and effect. Key Vocabulary component, current electricity, electron, negative terminal, positive terminal, series circuit, parallel circuit, terminal, voltage	including scientific diagrams, labels, timelines, classification keys, tables, models and graphs (bar, line and scatter), linking to mathematical knowledge. Use and construct classification systems to identify animals and plants from a range of habitats. Research unfamiliar animals and plants from a range of habitats, deciding upon and explaining where they belong in the classification system. Independently decide which observations to make, when and for how long and make systematic and careful observations, using them to make comparisons, identify changes, classify and make links between cause and effect. Report on and validate their findings, answer questions and justify their methods, opinions and conclusions, and use their results to suggest improvements to their methodology, separate facts from opinions, pose further questions and make predictions for what they might observe. Identifying scientific evidence that has been used to support or refute ideas or arguments. Key Vocabulary species, kingdom, microorganism, fungus	animals transports oxygen, water and nutrients around the body. Explain the impact of positive and negative lifestyle choices on the body. Plan and carry out a range of enquiries, including writing methods, identifying and controlling variables, deciding on equipment and data to collect and making predictions based on prior knowledge and understanding. Report on and validate their findings, answer questions and justify their methods, opinions and conclusions, and use their results to suggest improvements to their methodology, separate facts from opinions, pose further questions and make predictions for what they might observe. Report on and validate their findings, answer questions and justify their methods, opinions and conclusions, and use their results to suggest improvements to their methodology, separate facts from opinions, pose further questions and make predictions for what they might observe. Independently decide which observations to make, when and for how long and make systematic and careful observations, using them to make comparisons, identify changes, classify and make links between cause and effect. Choose an appropriate approach to recording accurate results, including scientific diagrams, labels, timelines, classification keys, tables, models and graphs (bar, line and scatter), linking to mathematical knowledge. Take accurate, precise and repeated measurements in standard units, using a range of chosen equipment. Key Vocabulary artery, breathing rate, capillary, circulatory system, liver, pulse rate	Skills Identify that living things produce offspring of the same kind, although the offspring are not identical to either parent. Describe how animals and plants can be bred to produce offspring with specific and desired characteristics (selective breeding). Identify how animals and plants are adapted to suit their environment, such as giraffes having long necks for feeding, and that adaptations may lead to evolution. Key Vocabulary Adaptation, artificial selection, genes, natural selection, organism, survival, variation
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	angle of incidence, angle of reflection, light source, opaque, reflection, refraction, spectrum, translucent				
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