Science at Ropley Church of England Primary School

Promote a natural curiosity about the universe and foster a life-long interest in Science

Support children to become independent, resilient and reflective scientists who are able to make observations and ask thought-provoking questions.

Inspire children to think scientifically

Prepare children for life in an increasingly scientific and technological world

EYFS Science Learning Journey

Objectives:

- Explore the natural world around them
- Be able to make observations of the natural world
- Begin to explore through Welly Walks each season
- Describe what they see, hear and feel whilst outside
- Recognise some environments that are different to the one in which they live
- Understand the effect of changing seasons on the natural world around them
- Talk about why things happen and how things work
- Be able to investigate with different materials
- Children know the importance for good health of physical exercise, and a healthy diet, and talk about ways to keep healthy and safe

Sticky Knowledge:

- Explore the natural world around them
- Be able to make observations of the natural world, including the effect of changing seasons
- Describe what they see, hear and feel whilst outside
- Talk about why things happen and how things work
- Be able to investigate with different materials
- Know the importance of good health through physical exercise, healthy diet and be able to talk about how to keep healthy and safe
- Be able to name body parts (head, shoulder, knee, toe, eye, ear, mouth and nose)
- Know somethings are alive whilst others are dead

Ropley Words:

Autumn, Spring, Summer, Winter, Material, Exercise, Body, Dead, Alive

Year 1

Animal Survival	**Knowledge Block 1- Feeding for survival** ● Animals are groups of **organisms** that need to consume food to survive. ● Food provides **energy** and the building blocks of **growth**. ● There are many different groups of animals including **fish, amphibians, reptiles, birds and mammals**. They have different structures, and they eat different types of foods. ● The structure of a variety of common animals varies **Mammals** have hair/fur and give birth to live young, **fish** can breathe underwater using gills, **birds** have feathers, beaks and wings. Females lay eggs. Most birds can fly, **reptiles** are air breathing and have scaly skin and lays eggs, and **amphibians** have smooth slimy skin and live on land and in water. ● Some eat other animals (**carnivores**), and others only eat vegetables (**herbivores**), and some like to eat both plants and meat (**omnivores**) ● Common animals that are **carnivores** include lions, cats, sharks and snakes ● Common animals that are **herbivores** include cows, horses, sheep, elephants and deer ● Common animals that are **omnivores** include humans, bears, monkeys and seagulls **Knowledge Block 2- Moving for survival** ● Animals must move to get their food ● They will move in different ways to get their food ● Animals that eat other animals are called **predators** ● Animals that are eaten by other animals are called **prey** ● Animals feeding relationships can be illustrated in a **food chain** **Knowledge Block 3- Sensing for survival** ● The five sense organs are the **eyes** (for seeing), **nose** (for smelling), **ears** (for hearing), **tongue** (for tasting), and **skin** (for touching or feeling). ● Animals have senses to help them survive ● Animals have developed a range of ways to find prey or avoid being eaten
Habitats	**Knowledge Block 1- Adapted to survive** ● There is variation in all living things ● Animals and plants live in a variety of different places called habitats ● Animals and plants have adapted to survive in different habitats ● Wild plants such as ferns, daisies, nettles and dandelions grow randomly. ● Garden plants such as roses, tulips, poppies, daffodils are planted intentionally. **Knowledge Block 2- Plants adaptations for survival** ● Plants have specific adaptations for survival ● To survive they need to get water, light, and avoid being eaten
Seasons	**Knowledge Block 1- Surviving the changing seasons** • There are four seasons, **Spring, summer, autumn** and **winter** ● Each season is about three months long ● In Spring, young animals like lambs and chicks are born, the flowers bloom and the weather starts to become warmer. ● In autumn, the leaves fall off the trees and the amount of time we have in the day becomes less. ● Winter has the shortest amount of time during the day and the weather is at its coldest. ● In summer the trees are full of green leaves and the weather is at its warmest. • Animals and plants have adapted ways of surviving the changing seasons • These include **hibernating**, storing food, fattening up, **migration**, loss of leaves • Trees can be either **evergreen** or **deciduous**. • **Evergreen** trees keep their green leaves all year round. • **Deciduous** trees lose their leaves every autumn.
Plants	**Knowledge Block 1- Where do plants come from** ● A **seed** contains a miniature plant that can develop into a fully grown plant. ● A **bulb** has underground vertical shoots which already has modified **leaves** ● Seeds and bulbs need water to grow but most do not need light (**germination**) ● Seeds and bulbs have food stores inside them to help the plant start to grow. **Knowledge Block 2- Plant survival** ● To survive plants, need to get water, light, and avoid being eaten **Knowledge Block 3- How plants get what they need to survive** ● A seed produces **roots** to allow water to get into the plant. ● A seed produces **shoots** to produce leaves to collect the sunlight.

	● A basic plant structure can include leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem
Describing Materials	**Knowledge Block 1- The big idea about materials** ● There are many different materials that have different observable **properties** ● Materials that have similar properties are grouped into **metals, rocks, fabrics, wood, plastic and ceramics** (including glass).

Disciplinary Knowledge

Measuring	Use simple equipment to measure closely
Gathering and recording	Gather and record data as a class or in groups to help answer questions
Communicating Findings	Make a simple written explanation about what has been learnt from an investigation or what conclusion has been found out
Classifying	Identify and classify simple groups

Sticky Knowledge

- Know a variety of common animals including fish, amphibians, reptiles, birds and mammals
- Know and identify a variety of common animals that are carnivores, herbivores and omnivores
- Know what is meant by predators and prey
- Know that animals and plants live in a variety of places known as habitats
- Know what plants need to survive
- Identify, name, draw and label the basic parts of the human body and what they do
- Know a variety of common wild and garden plants
- Know there are four seasons: spring, summer, autumn and winter
- Know the weather associated with the seasons
- Know how animals and plants survive the changing seasons
- Know a variety of everyday materials, including wood, plastic, glass, metal, water, and rock
- Know how to compare and group a variety of everyday materials
- Know that the properties of materials determines whether they are suitable for a purpose

Ropley Words

Material Properties Metal Rocks Fabric Wood

Plastic Seed Root Plant Survive Spring

Summer Autumn Winter Predator Prey Carnivore

Herbivore Omnivore

Year 2

Animal Life Cycles	**Knowledge Block 1- Animal timelines** ● Things that are **living**, move, feed, grow, **reproduce** and use their senses ● Animals grow until they reach **maturity** and then don't grow any larger ● Animals **reproduce** when they reach maturity (adulthood) ● All animals eventually, **die** ● Different animals live to different ages ● Different animals reach different sizes before they are able to reproduce ● Different animals reproduce at different ages ● Animals, including humans, have **offspring** which grow into adults ● Exercise, eating the right amounts of different types of food and **hygiene** are important to maintain good **health** and **wellbeing** **Knowledge Block 2- How animals get their food** ● **Habitats** are places where animals and plants live (from Year 1) ● Animals live in habitats in which they are suited. ● Different kinds of animals and plants depend on each other within **habitat**. ● Animals get their food from plants and other animals. This can be shown in a **food chain**. ● A food chain begins with a **producer**. This is often a green plant because plants can make their own food. ● A living this that eats other plants is called a **consumer**.
New Plants	**Knowledge Block 1- What flowers are for** ● All **flowering plants** make seeds (**reproduction**) that can grow (**germinate**) into new plants ● Plants need water, light and a suitable temperature to grow and stay healthy **Knowledge Block 2- What happens after a plant has produced seeds** • Some plants die after it has produced its seed and sometimes the plant lives for many **generations** producing seeds each year
Pushes and pulls	**Knowledge Block 1** • Objects can move (be in **Motion**) in various ways-roll, slide and bounce **Knowledge Block 2** • The **pushing** or **pulling** of an object can affect its motion. • Pushing or pulling can do three things, **slow down, speed up or change the direction** of an object. **Knowledge Block 3** • The larger the push/pull the bigger the effect on motion
Changing Materials	**Knowledge Block 1- How materials can change** ● The properties of a material determine whether they are **suitable** for a **purpose**. ● Materials can be **changed** by **physical force** (twisting, bending, squashing and stretching). ● (The purpose of the activities within this learning journey is for children to understand why we choose certain materials to do certain jobs. Children will plan how to test materials (wood, metal, plastic, glass, brick, paper, rock, cardboard))

Disciplinary Knowledge

Measuring	Use simple equipment like thermometers and rain gauges to observe changes closely over time
Gathering and recording	Gather and record data to help to answer questions including using secondary sources of information using labelling and diagrams, graphs or tables
Communicating Findings	Explain what has been done within an investigation and a simple report discussing what was learnt
Classifying	Identify, group and classify according to given criteria
Concluding and questioning	Use his/her observation and ideas to suggest answers to questions noticing similarities and patterns

Sticky Knowledge

- Know the differences between things that are living, dead, and things that have never been alive
- Know a variety of animals and plants found in different habitats
- Know how animals obtain their food from plants and other animals
- Know animals, including humans, have offspring which grow into adults
- Know that the larger push/pull, the bigger the effect on motion.
- Know why different materials are suitable for different purposes
- Know that some materials can be changed by physical force: squashing, bending, twisting and stretching

Ropley Words

Hibernating Migrating Life cycle Maturity Reproduce

Offspring Food chain Absorb Suitable Flexible Strongest

Motion Pushing Pulling Germination Shoots Leaves

Year 3

Magnets	**Knowledge Block 1- What magnets do** • Magnets exert **attractive forces** on some **metals** **Knowledge Block 2- Magnets don't need to touch** • Magnetic forces work through other materials including air, so magnets don't need to be touching to **exert** their force. It is called a **non-contact force** **Knowledge Block 3- Magnets attract and repel** • Each end of a magnet is called a **pole**, opposite poles are called north and south. • Magnets exert **attractive** forces on each other when the poles facing each other are north and south (opposites). • Magnets exert **repulsive** forces on each other when the poles facing each other are the same. **Knowledge Block 4- what affects magnetic strength** The strength of magnetic forces is affected by: • The strength of the magnet. • The distance between the magnet and the object. • The material the object is made from.
Animals, skeletons and movement	**Knowledge Block 1- Skeletons protect vital organs** • All **vertebrates** have internal **skeletons** that protect **vital organs**. • **Invertebrates** have **exoskeletons** that protect **vital organs**. **Knowledge Block 2- Skeletons support weight** • Skeletons support the weight of land animals. • Stronger bones can **support** a greater **mass.** **Knowledge Block 3- Skeletons support movement** • Bones are **connected** (but can move relative to each other) at joints. • **Muscles** connect to bones and move them when they **contract**. • Stronger bones can **anchor** stronger muscles.

Plants and their food production	**Knowledge Block 1- Plants don't go to McDonalds**
	• Plants do not eat food so have to make their own.
	• This food provides then with energy, and materials to grow
	• To make the food (sugar) plants need water from the ground, **carbon dioxide** from the air and light from the sun.
	  ○ The water is taken up through the **roots** from the **soil**
	  ○ The carbon dioxide is taken in through the **leaves**
	• As well as food, plants also make **oxygen** which is given out back into the air through the leaves

Light	**Knowledge Block 1- Light and sight** • There must be light for us to see. • Light comes from a **source**. • We need light to see things, even **shiny** things. • Light from the sun can be dangerous and that there are ways to protect their eyes **Knowledge Block 2- What light does when it hits materials** • If an object is **transparent** light will go through it and we will be able to see through it. • If an object is **opaque,** it will block the light and no light will get through. This is what forms shadows. • The closer to the light source an object is, the bigger the shadow will be. This is because the object blocks more of the light. • The further away from the light source an object is, the smaller the shadow will be. This is because the object blocks less of the light. • If an object is perfectly **reflective,** light will bounce back off it and we will see reflections of objects. • If the material is **translucent,** it will allow light through, but we won't be able to see through it.

Solids, liquids and gases	**Knowledge Block 1- Properties of solids, liquids and gases** • Materials can be divided into solids, liquids and gases. • **Solids** hold their shape unless forced to change. • **Liquids** flow easily but stay in their container because of **gravity**. The more **viscous** a liquid the less runny it is. • **Gases** move everywhere and are not held in containers by **gravity**. **Knowledge Block 2- Changing state** • **Heating** causes solids to **melt** into liquids and liquids to **evaporate** to gases. • **Cooling** causes gases to **condense** to liquids and liquids to **freeze** to solids. **Knowledge Block 3- Melting, freezing, boiling and condensation temperatures** • Different substances change **state** at different temperatures but the temperatures at which given substances changes state is always the same. **Knowledge Block 4- All about the water cycle** • The temperature at which a substance **melts** from a solid to a liquid is the same at which it **freezes** from a liquid to a solid. • The temperature at which a substance **boils** from a liquid to a gas is the same at which it **condenses** from a gas to a liquid. • Liquids **evaporate** slowly, even below their boiling temperatures. • The water cycle is the process by which water is continuously transferred between the surface of the earth and the atmosphere. • Liquid water evaporates into water vapour, condenses to form clouds, and precipitates back to earth in the form of rain and snow.
Rocks and soils	**Knowledge Block 1- The different types of rocks** • A **rock** is a solid material made up of **minerals** forming part of the surface of the Earth • Rocks are exposed on the surface at cliffs, hills and mountains but are also under the surface. • Some rocks, called **ores** contain metals • Some rocks are made of **grains** squashed together and can contain the remains of long-dead organisms, called **fossils**. This type of rock is called **sedimentary** rock, an example would be **limestone**, **sandstone** or **mudstone** • Some rocks are made of **crystals** that are locked tightly together. These are called **igneous** and **metamorphic** rocks; an example of igneous rock is **granite,** and an example of metamorphic rock is **slate** **Knowledge Block 2- The properties of rocks** • These three types of rocks all have different properties to each other, including **porosity**, **hardness**, reaction to chemicals • The properties of the rock depend on how the rock was formed, e.g. Some igneous rocks form from lava from volcanoes and cool very quickly leading to very small crystals **Knowledge Block 3- The structure of soils** • **Soil** is made up of small broken-down pieces of rock. • Soil contains a range of different size rock pieces, e.g., sand grains or stones. • Soil also contains **humus** (rotted plant material) • Soil made of very fine rock is called **silt** or **clay**.

Disciplinary Knowledge

Measuring	• Make systematic and careful observations, and where appropriate, take accurate measurement using standard units of measure
Gathering and recording	• Gather record, classify and present data in a variety of ways to help in answering questions • Use labelled diagrams, keys and child constructed bar charts and tables
Communicating Findings	• Results put in a clear table with potentially a bar chart if applicable. • Explanation of the results and conclusion.
Classifying	• Group information according to common factors • Use of Venn and Carroll diagrams
Concluding and questioning	• Use results to draw simple conclusions. • Be able to make predictions for new variables. • Suggest improvements if they were to conduct the investigation again • Can explain what a fair test it

Sticky Knowledge

- Know that skeletons protect vital organs
- Know that skeletons support weight and movement
- Know how water is transported within plants
- Know what plants need to make food
- Know each end of a magnet is called a pole which means they attract or repel each other
- Know shadows are formed when the light from a light source is blocked
- Know that light comes from a source
- Know that we need light in order to see things and that dark is the absence of light
- Know solids, liquids and gases are different states of matter and have different properties
- Know the effect heating and cooling has on states of matter
- Know what is meant by melting, boiling, freezing, evaporation and condensation
- Know different types of rocks on the basis of their appearance and simple physical properties
- Know that soil is made from rock and organic matter
- Know the process of the water cycle

Ropley Words

Magnet Exert Attract Repel Force Pole Skeleton

Vertebrate exoskeleton Muscle Solid Liquid Gas

State Evaporate Condense Freeze Boil

Carbon dioxide Oxygen Transparent Sedimentary Limestone

Sandstone Igneous Metamorphic

Year 4

Mixtures and separating them	**Knowledge Block 1- What mixtures are** • A **substance** is an object with the same properties throughout. • A **mixture** is when more than one substance is present in the same container **Knowledge Block 2- What dissolving is** • When a substance is added to a liquid the substance can disappear- this is called **dissolving** • A mixture of a substance that has dissolved in a liquid is called a **solution** • Not every substance can dissolve in water **Knowledge Block 3- Separating mixtures** • Mixtures can be separated if the substances have different properties • This is because the substances in the mixture are still present and are unchanged • There are different techniques for separating mixtures. - Filtration requires the substances be one that does not dissolve in a liquid to work. - Sieving requires the substances to be of different sizes to work - Magnets requires the substances to be some magnetic materials and some non-magnet materials to work. - Evaporation requires a solid substance dissolved in water and the solid has a higher boiling point in water to work. - Floating requires some substances to float and some substances to sink to work.
Digestion	**Knowledge Block 1- Food groups** o Animals need a variety of foods to help them grow and survive. The main food groups are: • **Meat**, **dairy** and pulses provide **protein** for muscles. • **Grains** and **root vegetables** provide **carbohydrates** for energy. • **Fat** for **insulation** and energy. • **Fruit** and **vegetables** for **minerals, vitamins and fibre**. These are essential to keep our bodies working well and protect us from illnesses. **Knowledge Block 2- Variation in animals' diet** • Different animals require different foods to survive. • Animals get their food from plants and other animals. This can be shown in a **food chain**. (From Year 2) • A food chain begins with a **producer**. This is often a green plant because plants can make their own food. (From Year 2) • A living this that eats other plants is called a **consumer**. (From Year 2) • Humans require a balanced diet to remain **healthy** but healthy diets vary depending upon the type of activity that humans do. • Humans have 2 sets of teeth in their lifetimes • Humans have three main types of teeth- incisors, canines and molars. • Incisors help to bite off and chew pieces of food. • Canines are used for tearing and ripping food. • Molars help to crush and grind food. **Knowledge Block 3- How humans digest food** • The **nutrients** in food have to get to every part of the body. The **blood** transports them. • The role of **digestion** is to get the nutrients in food to dissolve in the blood, if it doesn't dissolve it can't enter the blood and be transported.
Living Things	**Knowledge Block 1- Classifying living things** • Living things can be divided into groups based upon their characteristics • **Classification keys** help group, identify and name living things • Animals can be classified as **vertebrates** (having a spine) or **invertebrates** (lacking a spine) • In any habitat there are **food chains** and webs where **nutrients** are passed from one **organism** to another when it is eaten • If the population of one organism in the chain or web is affected, it has a knock-on effect to all the others **Knowledge Block 2- Life cycles** • Mammals, amphibians, insects and birds have different life cycles. • Lifecycles vary in time depending on the species of animal- it can be as short as just a few weeks for insects, to up to 200 years for sea urchins. Larger animals often have longer life cycles but not always. • All animal life cycles begin with growth and development followed by reproduction.

	• Some animals undergo a complete **metamorphosis** as they grow. Metamorphosis is a process where animals undergo an abrupt and obvious change in the structure of their body and their behaviour. • Some animals are eusocial. This means they live in colonies (groups) with one animal or group producing young and the others working to care for them. **Knowledge Block 2- Environmental change** • **Environmental change** affects different habitats differently • Human activity significantly affects the environment • Different organisms are affected differently by environmental change
Plant Reproduction	**Knowledge Block 1- The reproductive parts of a flowering plant** • Flowering plants **reproduce** by the process of **pollination** • Pollination leads to the formation of a **seed** which can grow into a new plant • Flowering plants have evolved specific parts to carry out pollination and seed growth • Those parts are **stamen** where pollen is produced, **stigma** where pollen is collected, and the **ovaries** which contains the eggs that become a seed when the pollen travels down the stigma and meets the egg • Flowers have **petals** also are a range of colours, patterns, and smells to attract insects **Knowledge Block 2- All flowers are similar but different** • Plants and flowers look different because they pollinate in different ways. • There are two types of pollination Insect and wind • Insect pollinated flowers are usually bright coloured and strong scents • Wind pollinated flowers have less colourful petals and much less scent **Knowledge Block 3- Seed dispersal** • Plants have evolved many different ways to **disperse** their seeds • Seed dispersal increases the chances of seeds **germinating** and growing into a mature plant **Knowledge Block 4- What a seed does** • A seed contains a miniature, undeveloped version of the plant • They contain a food store for the first stage of growth (until the plant can make its own food) • They are surrounded with a protective coat.
Electricity	**Knowledge Block 1- Electricity as a power source** • Lots of **devices** are powered by **electricity** • Electricity comes from a source There are two main sources- **batteries and mains** **Knowledge Block 2- What batteries do** • A battery pushes electricity to the device. • To be able to push electricity the battery must be connected to the device using **wires** • This is called a **circuit** **Knowledge Block 3- Making devices work harder** • If there are more batteries added to a circuit this provides a bigger push on the electricity • This will make the device work harder e.g., brighter bulbs, faster spinning motor, louder buzzer **Knowledge Block 3- Insulators and conductors** • Some materials will allow electricity to flow through them- **Conductors** • Metals such as silver, gold and copper are good conductors. Water is also a conductor of electricity. • Other materials will not allow electricity to flow through them- **Insulators** • Plastic, wood, glass and rubber are good electrical insulators. That is why they are used to cover materials that carry electricity. • A switch opens and closes a circuit

Disciplinary Knowledge

Measuring	• Make systematic and careful observations, and where appropriate, take accurate measurement using standard units of measure
Gathering and recording	• Gather record, classify and present data in a variety of ways to help in answering questions • Use labelled diagrams, keys and child constructed bar charts and tables
Communicating Findings	• Results put in a clear table with potentially a bar chart if applicable. • Explanation of the results and conclusion.
Classifying	• Group information according to common factors • Use of Venn and Carroll diagrams
Concluding and questioning	• Use results to draw simple conclusions. • Be able to make predictions for new variables. • Suggest improvements if they were to conduct the investigation again • Can explain what a fair test it

Sticky Knowledge

- Know animals need a variety of foods to grow and survive
- Know the names of the main food groups: meat, dairy, protein, carbohydrates, fats, fruit and vegetables
- Know the different types of teeth in humans and their simple functions
- Know the simple functions of the digestive system in humans
- Know the reproductive parts of a flowering plant
- Know that living things can be grouped in a variety of ways
- Know electricity is a power source
- Know batteries and mains are the two main sources of electricity
- Know what a cell, wire, bulb, switch and buzzer is
- Know some common appliances that run on electricity
- Know what is meant by a loop or complete circuit
- Know what batteries do
- Know the effect of adding more batteries to a circuit
- Know what is meant by a conductor
- Know what is meant by an insulator
- Know a substance is an object with the same properties throughout
- Know a mixture is when more than one substance is present in the same container
- Know what is meant by dissolving
- Know mixtures can be separated if they have different properties
- Know there are different techniques for separating mixtures: filtration and sieving, magnets, evaporation and floating

Ropley Words

Substance Mixture Dissolving Solution

Filter Sieving Vitamins Fibre Minerals

Insulation Digestion Pollination Disperse

Circuit InsulatorConductor Classification key

Organism

Year 5

Fossils, Geological Time and Classification	**Knowledge Block 1- What is evolution and how do we know it happened?** ● The Earth is very old. Around 4.2 **billion** years. We know this from dating rocks ● Life first appeared on Earth around 3.8 billion years ago. ● Life was, at first, very simple but over **millions** and millions of years life became more complex through the process of **evolution** **Knowledge Block 2- Evidence for evolution** ● There are many sources of evidence for evolution ● **Fossils** are one of the main sources of evidence for evolution. They show when new organisms appear and when they go **extinct**. ● Due to the nature of fossil formation and discovery, fossils only provide an incomplete record of evolution. ● Scientists use fossils along with other pieces of evidence *(DNA, Embryology, comparative anatomy, artificial selection)* to work out how organisms have evolved ● Fossils form when dead organisms are rapidly buried or leave an imprint and are turned to stone over a long period of time. If they survive in the Earth, they then have to be found by a **palaeontologist** who will study them. **Knowledge Block 3: Classification of life** ● All living (and **extinct**) **organisms** are classified into groups based upon their physical features. ● This includes animals, plants, fungi, and **microorganisms** like **bacteria**. ● Within each of these broad groups, organisms are classified into small subgroups. Animals- invertebrates, mammals, birds, amphibians, reptiles and fish, Plants- flowering plants, ferns, conifers, moss. ● Bacteria are a group of organisms that are not visible to the naked eye but are very abundant and have distinct physical features we can only see under powerful **microscopes**.
Circulation	**Knowledge Block 1: Getting oxygen into the blood** • All animals need **oxygen** to survive. • Air is breathed into the **lungs** where the oxygen in the air is passed into the blood. • Every part of animals' bodies need oxygen, especially **muscles**. • Muscles need a supply of oxygen and **sugar (glucose)** to make them work, they are supplied by the blood. **Knowledge Block 2: The blood circulation model** • The heart is a vital organ pumps blood through the blood vessels. • Blood Vessels are the tubes that blood flows through. • The blood **circulates** around the body in a way that ensures all muscles in the body get a supply of oxygen and sugar. • The **heart** pumps blood to every muscle in the body. The circulatory route must allow the blood to collect oxygen from the lungs, sugar from the intestines and visit muscles. • The blood then returns to the heart where it is pumped again. • Exercise helps the heart to work more efficiently. • Eating a healthy diet helps to keep the blood vessels from getting blocked. • Avoiding smoking and alcohol puts less stress on the whole system and keeps it healthier.
Space and Gravity	**Knowledge Block 1: Our Solar system** • A **Solar system** is a collection of **planets**, which **orbit** (a curved path) a **star**. • There are huge number of stars in space and therefore a huge number of solar systems • Our solar system consists of 8 planets, many of those planets have **moons** which orbit around them. • Earth's moon is not a planet but is a satellite which orbits Earth. It is around a quarter of the size of Earth. • As the Moon orbits the Earth, the Sun lights up different parts of it, making it seem as if the Moon is changing shape. We call these the phases of the moon. • The Moon doesn't emit (give off) light itself, the 'moonlight' we see is actually the Sun's light reflected off the lunar surface. • Our solar system can be represented with a model (see diagram), but it isn't possible to draw it to scale. • The planets and moons are **rotating** (spinning) • The time it takes one planet to rotate is called a **day**. On Earth this is 24 hours

	• The time it takes a planet to complete one orbit around its star is called a **year**. On Earth this is 356.25 days • The solar system is with a massive collection of stars called the **galaxy** (called the Milky way) • The Milky way is one of billions of galaxies in the **Universe**. **Knowledge Block 2: What else is in the solar system?** • Stars are huge balls of gas that produce vast amounts of light and heat. • **Asteroids** are lumps of rock that orbit a star (there are millions in between Mars and Jupiter) • **Comets** are objects that are made of Ice, which melts when they get closer to the sun leaving a tail. **Knowledge Block 3: Gravity and its effects** • **Gravity** is force of attraction between two objects with **mass** (a quantity of matter) • The bigger the mass the bigger force it exerts • Gravity works over distance but gets weaker as distance increases • Stars, planets, moons have a very large amount of mass. They exert a gravitational attraction on each other • Differences in gravity result in smaller mass objects orbiting around lager mass objects, e.g., planets around stars and moons around planets
Forces that oppose motion	**Knowledge Block 1: Water and air resistance.** • When objects move through air and water, they have to push it out of the way. The water and air push back with forces called **water resistance** and **air resistance**. The harder it is to push the material out of the way the greater the resistance. • Gases weigh less than liquids and so water resistance is greater than air resistance. **Knowledge Block 2: Friction** • **Friction** is a **force against motion** caused by two surfaces **rubbing** against each other. It occurs because no surfaces are perfectly smooth; they have bumps and **undulations** that can **interlock** when placed on top of each other. • To move one **interlocking** surface over another, one of three things must happen: • The surfaces must rise slightly • The bumps on the surface must bend • The bumps on the surface must break • All of these actions require a force, this is what causes friction **Knowledge Block 3: Managing Forces** • Some objects require large forces to make them move; **gears**, **pulley** and **levers** can reduce the force needed to make things move. • The use of levers can reduce the force needed to move things. The object you are lifting is called the **load**, and the force you apply to the arm to make the object move is called the **effort**. • The use of pulleys can reduce the force needed to move things
Reversible and Irreversible changes	**Knowledge Block 1: Reversible and irreversible changes** • All matter, including gas, has **mass**. • Sometimes, mixed substances **react** to make a new substance. These changes are usually **irreversible**. • Heating can sometimes cause materials to change permanently. When this happens, a new substance is made. These changes are not reversible. • Indicators that something new has been made are the properties of the material are different (colour, state, texture, hardness, smell, temperature) • If it is not possible to get the material back easily it is likely that it is not there anymore and something new has been made (irreversible change)

Disciplinary Knowledge

Measuring	• Take measurements using a range of scientific equipment with increasing accuracy and precision - and taking repeated readings when needed
Gathering and recording	• Record data and results using more complex analysis with bar charts and some line or scatter graphs
Communicating Findings	• Results put in a clear table with potentially a line or scatter graph if applicable. • Explanation of the results and conclusion. Illustrations and diagrams drawn to demonstrate understanding.
Classifying	• Group and classify things and recognise patterns using appropriate ways of presenting. Children should select appropriate way to present
Concluding and questioning	• Evaluate when explaining findings from scientific enquiries. • Talk about what happened in previous enquiries as a basis for predicting outcomes

Sticky Knowledge

- Know how fossils are formed and how scientists use them
- Know how all living and extinct organisms are classified into groups based on their physical features.
- Know what the circulatory system does
- Know that a solar system is a collection of planets which orbit a star
- Know the planets and moon rotate
- Know a day is the time it takes one planet to rotate; a year is the time it takes for the planet to orbit around the sun.
- Know what is meant by gravity
- Know what is meant by water and air resistance
- Know what is meant by the term friction
- Know what is meant by a reversible change
- Know what is meant by an irreversible change

Ropley Words

Evolution Fossils Extinct Palaeontologist Orbit

Solar system Galaxy Moon Planets Universe

Mass Air resistance Water resistance Friction

Lungs Circulation

Year 6

How light behaves	**Knowledge Block 1: How light travels** • When light is emitted from a light source, it travels in straight lines until it hits an object. This can be represented by an arrow. • **Shadows** form when light hits an **opaque** object. The area behind the object is in darkness because light can only travel in straight lines. • Shadows have the same shape as the objects that cast them. **Knowledge Block 2: How light behaves when it hits objects** • When light hits a **transparent** object, it goes through it in a straight line so we can see a clear image through it. • When light hits a **translucent** material, it goes through it but is scattered, this means light can pass through, but we can't see an image through it. • When light hits a mirrored surface, it reflects off it in straight lines, so we can see an image in the reflective material. • Sometimes when light hits a material it **reflects** off it in many different directions (it is scattered). In this case light will be reflected but no image will be seen in the material. • Shiny surfaces are better reflectors and rough surfaces scatter light more. Opaque objects don't allow any light to pass through them **Knowledge Block 3: How we see** • Animals see objects when light is reflected off the object and enters the eye through the **pupil**. • The pupil changes its size to allow enough, but not too much light into the eye. • Too much light damages the eye and too little results in poor quality images.
Classification and Evolution	**Knowledge Block 1: Natural selection** • **Evolution** is the change of physical form in a population over a long-time span • **Natural selection** is the process which controls that change. • In any **population** there is **variation** and **competition** for resources (food, water, mates). • Within that variation, organisms that have features which make them better **adapted** at securing food, water, and mates, are more likely to survive and produce **offspring** which have **inherited** those same successful features. Those that are not well adapted will eventually go **extinct**. • Over a long enough timeline all organisms in a population will have those successful features. • This is known as the *Theory of Evolution by Natural Selection* and was developed by **Charles Darwin** in 1859 **Knowledge Block 2: How Charles Darwin discovered the process of Evolution by Natural selection** Before Darwin, **Lamarck's** Idea of acquired characteristics was proposed. (Giraffes stretch their necks in life, which made their children have longer necks). Darwin as a young man travelled around the world on the **HMS Beagle**. On this 5-year voyage he saw lots of things and recorded down lots of evidence which allowed him to work out how organisms change over time by a different mechanism of Natural selection
Controlling electrical circuits	**Knowledge Block 1: Pushing electrical current** • Current is the flow of electricity around a circuit. • The power supply in a circuit pushes the current round the circuit • The voltage of the power supply is a measure of this push • Voltage is measure in volts • Batteries have a limited store of energy and when this is gone, they can no longer push the current **Knowledge Block 2: Electrical current** • Current is the flow of electricity through a **conductor** • When current passes through a device it makes it work • Increasing the voltage (the number of cells in the battery) increases the current. The larger the flow of current, the harder the device works **Knowledge Block 3: Electrical resistance** • All parts of a circuit offer **resistance** to electrical current including the wires. • Resistance is the slowing down of electrical current • The more devices added into a circuit the greater the resistance. This means less current flows around the circuit

Sound	**Knowledge Block 1: Describing Sound** ● Sounds can be produced in a variety of ways. ● Sounds have the properties of **pitch** and **volume.** ● When a sound is produced it spreads out from its source in all directions **Knowledge Block 2: How sound is made and travels** ● Sound is caused by **vibration** (objects move rapidly back and forth or up and down) ● When objects vibrate it makes the objects in contact with it also vibrate. This includes the air. ● The vibration travels through the air and makes other objects it is in contact with vibrate including your **ear drum**. **Knowledge Block 3: Pitch and Volume changes** • Pitch and volume are caused by how the material vibrates • The pitch of a sound is caused by how fast an object vibrates. This is called the **frequency** of vibration. Higher the frequency, higher the pitch • Smaller objects or tighter strings tend to vibrate with a higher frequency • The volume of sound is caused by how big each vibration is. This is called the **amplitude** of vibration. The bigger the amplitude the higher the volume. • Sounds get fainter as the distance from the sound source increases.
Making new substances	**Knowledge Block 1: Reversible and irreversible changes** • All matter, including gas, has **mass**. • Sometimes, mixed substances **react** to make a new substance. These changes are usually **irreversible**. • Heating can sometimes cause materials to change permanently. When this happens, a new substance is made. These changes are not reversible. • Indicators that something new has been made are the properties of the material are different (colour, state, texture, hardness, smell, temperature) • If it is not possible to get the material back easily it is likely that it is not there anymore and something new has been made (irreversible change)

Disciplinary Knowledge

Measuring	• Take measurements using a range of scientific equipment with increasing accuracy and precision - and taking repeated readings when needed • Use of averages
Gathering and recording	• Record data and results using more complex analysis such as scatter graphs and line graphs
Communicating Findings	• Results put in a clear table with potentially a line or scatter graph if applicable • Explanation of the results and conclusion. Illustrations and diagrams drawn to demonstrate understanding
Classifying	• Use of classification keys
Concluding and questioning	• Evaluate when explaining findings from scientific enquiries. • Talk about what happened in previous enquiries as a basis for predicting outcomes

Sticky Knowledge

- Know that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago
- Know that natural selection is the process which controls the change over time
- Know that living things produce offspring of the same kind but normally offspring vary and are not identical to parents
- Know what is meant by adaptation
- Know what is meant by evolution
- Know who Charles Darwin was and his key discoveries
- Know that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes
- Know why shadows form
- Know the meaning of transparent, translucent, reflective and opaque
- Know that light appears to travel in straight lines
- Know about how the eye responds to light

- Know what is meant by voltage
- Know why a bulb may become brighter or dimmer
- Know and be able to draw the symbol for a cell, buzzer, lamp, switch and motor
- Know what is meant by pitch and volume

Ropley Words

Transparent Translucent Opaque Natural Selection

Inherit Extinction Current Voltage Vibration Pitch

Volume