Science

At Norton Community Primary School

Our science curriculum engages and enthuses children by providing relevant, first-hand experiences of scientific phenomena in the everyday world. From their low starting points, children build secure knowledge and terminology for each area of study. Excellent teaching ensures this is consolidated and extended during children's time at our school.

We encourage children to develop and maintain an inquisitive mind, questioning what they see, hear and feel. Children's ideas are valued and respected. Teachers' detailed yet flexible planning ensures that children's natural curiosity is captured to enable them to extend their scientific understanding.

From an early age, children are supported to think scientifically, using new vocabulary to effectively communicate their thoughts and observations. As they progress through the Programme of Study, teachers guide children to plan, lead and reflect on scientific investigations, developing independent thought and learning.

Contents

Year One

Y1 - Animals including humans

Key essential knowledge

- Amphibians are cold blooded. They live in water and land.
- Birds are warm blooded. They lay eggs Most birds have feathers and beaks.
- Fish are cold blooded. They live in water . Fish breathe through gills.
- Mammals are warm blooded. They give birth to live young and make milk to feed them. Humans are mammals.
- Reptiles are cold blooded. They lay eggs. They have scales.
- Nocturnal animals are active at night time.
- Diurnal animals are active in the daytime.
  Humans have 5 senses: sight, hearing, smell, touch and taste.

Terminology

fish, amphibians, reptiles, birds, mammals, carnivore, herbivore, omnivore, nocturnal, diurnal

Scientific Enquiries

- Using classification trees to classify animals using soft toys as representations **(classifying and grouping)**.
- Asking questions about animals and using books and the internet to research them **(research using secondary sources)**

Books

- Bog Baby- Jeanne Willis
- The Enormous Crocodile- Roald Dahl
- Argh Spider- Lydia Monks
- The Owl and the Pussycat- Edward Lear

Y1 - Plants

Key Essential Knowledge

- Deciduous trees lose their leaves in the autumn every year.
- Their leave are generally broad, flat and have veins running through them.
- Evergreen trees have green leaves all year round. Their leaves are generally thick, waxy and narrow like needles.
- Some flowers grown especially in a garden. Some common garden plants are roses, daffodils, sunflowers and tulips.
- A wild plant will grow by itself. It does not need to be cared for. Some common wild plants are daisies, dandelions and buttercups.

Terminology

leaves, flowers, petals, fruit, roots, bulb, seed, trunk, branches, stem, deciduous, evergreen, coniferous

Scientific Enquiries

- Grouping different types of plants **(classifying and grouping)**
- Observing plants over the year and keeping record of how they have changed **(observation over time)**
- *Do trees with bigger leaves lose their leaves first in autumn?* **(pattern seeking)**

Books

- The Tale of Peter Rabbit- Beatrix Potter
- Jim and the Beanstalk- Raymon Briggs
- Oliver's Vegetables- Vivian French

- The Little Gardener- Emily Hughes
- Lollipop and Grandma's Back Garden Safari- Penelope Harper

Y1 - Seasonal changes

Key Essential Knowledge

- There are four seasons each year: autumn, winter, spring and summer.
- In autumn the weather begins to get cooler. Leaves fall from trees. The amount of daylight becomes less.
- In winter the weather is much colder. Sometimes it is cold enough to freeze. The daytimes are the shortest and the night times are the longest.
- The weather includes the temperature outside, the wind direction and strength, as well as rain, cloud, sun and snow.
- Daylight is the amount of light outside. The amount of daylight changes within each season.

- **Terminology**

Autumn, Spring, Summer, Winter, weather, temperature, thermometer, weather symbol, deciduous, coniferous

Scientific Enquiries

- Children to keep records of the weather and discuss patterns **(pattern seeking)**
- *Is it always windy when it is raining?*
- *Does the wind always blow the same way?*

Books

- The Rabbit Problem- Emily Gravett
- Kate, Who Tamed the Wind - Liz Garton Scanlon and Lee White
- Ollie's Magic Bunny - Nicola Killen
- Tree: Seasons Come and Go - Britta Tekentrap
- Moon - Britta Tekentrap
- Winnie-the-pooh A.A Milne
- Poetry: Autumn Fires and the Gardener - Robert Louis Stephenson

Y1 - Everyday materials

Key Essential Knowledge

- Objects are made from materials. E.g. metal, wood, rock.
- Objects can be grouped based on the materials they are made from.
- Every material has different properties. For example, paper is soft and smooth.
- Materials can be natural or man made

Terminology

hard, soft, stretchy, stiff shiny, dull, rough, smooth, waterproof, not waterproof, natural, man made

Scientific Enquiries

- Which is the best material to make a model house, an umbrella etc. **(fair testing)**
- *Is there a pattern in the types of materials that are used to make objects in a school?* **(pattern seeking)**

Books

- Beegu (*What does Beegu think of life on Earth?)* Alexis Deacon
- Dogger (*Why is Dogger a good toy? What if he was made of something else?)*
- Golidlocks and the Three Bears (*What makes something right?)*
- The Three Little Pigs (Their houses are made of different materials. What happens differently?)

Year Two

Y2 - Animals including humans

Key Essential Knowledge

- All young animals change as they go through the different stages of their life cycle and grow into adults.
- Some animals give birth to live young; some animals lay eggs which the young hatch from.
- Some offspring look like their adult when they are born, whereas some offspring do not.
- To stay alive all animals have three basic needs for survival: water, air and food.
- To grow into a healthy adult we must eat the right types of food in the right amount and exercise.
- To stop germs from spreading it is important to be hygienic.

Terminology

Adult, develop, offspring, young, live young, exercise, nutrition, hygiene, germs.

Scientific Enquiries

- Researching and recording the growth of different animals **(research using secondary sources)**
- *Who has the largest hand-span*? (**Pattern seeking** between hand-span and height or feet size)
- *Which habitat do worms prefer? Where can we find the most worms?* **(pattern spotting)**
- *Which offspring belongs to which animal?* **(identifying, grouping and classifying)**

Books

- Burger Boy- Alan Durant
- Handa's surprise- Eileen Brown
- Little Mist- Angela McAllister
- Dr Dog- Barbette Cole
- Big Smelly Bear- Britta Teckentrup

Y2 - Plants

Key Essential Knowledge

- Plants may grow from either seeds or bulbs.
- Seeds germinate and grow into seedlings which then continue to grow into mature plants.
- Mature plants may have flowers which then develop into seeds, berries, and fruits.
- Seeds and bulbs need to be planted outside at particular times of the year. Some plants are better suited to growing in full sun and some grow better in shade.
- Plants need different amounts of water and space to grow well and stay healthy.

Terminology:

seed, bulb, roots, stem, petal, leaves, oxygen, habitat, growth, shade

Scientific Enquiries:

- Observing and recording the growth of a plant over time **(observation over time)**
- What conditions do plants need to grow? (**comparative test** of plants growing in different locations- dry, wet, light, dark.

Books

- Little Evie in the Wild Wood - Jackie Morris
- A Seed is Sleepy - Dianna Aston
- The Little Fir Tree - Christopher Corr
- Miss Maple's Seeds - Eliza Wheeler
- Paddington in the Garden - Michael Bond

Y2 - Living things and their habitats.

Key Essential Knowledge

- Living things can be split into three groups: things that are alive, things that were once alive but are now dead, and things that have never been alive.
- Most living things live in am environment they are suited to. This is their habitat.
- Habitats can be different, for example hot or cold, wet or dry, on the ground or up high.
- Habitats are suited to the basic needs of animals and plants.
- A food chain shows how each animal gets its food. The chain will always start with a plant

Terminology

sea, rivers, woodland, ponds, rainforest, desert, species, habitat, microhabitats, prey, predator, carnivore, omnivore, herbivore, survive

Scientific Enquiries

- Children to explore how the conditions of a habitat affect the number of woodlice **(Pattern Seeking)**
- *Where do we find the most woodlice?*

Books

- A Tadpole's Promise - Jeanne Willis
- The Tales of Jemima Puddleduck, Jeremy Fisher and Squirrel Nutkin
- The Ladybird Big Book of Dead Things - Ned Hartley
- Run Wild - David Covell (online)
- There's a Rang-Tan in my Bedroom - James Sellick
- An Otter Called Pebble - Helen Peters
- The Big Book of the Blue - Yuval Zommer
- When the Bees Buzzed Off - Lula Bell
- The Coral Kingdom - Laura Knowles
- Tad- Benji Davies (online)

Y2 - Uses of everyday materials.

Key Essential Knowledge

- Materials are used for different purposes based on their properties. For example, wood is used to make furniture and floors because it is strong, smooth and can be easily cut to the right shape.
- Metal can be used to make coins, cars and cutlery because metal is strong and waterproof.
- Glass is used to make windows because it is transparent.
- Children's toys are often made from plastic because it is lightweight and can be made into different shapes.
- The shape of some materials can be changed when they are bent, twisted, squeezed and stretched.

Terminology

absorbent, opaque, transparent

Scientific Enquiries

- Which material makes the best waterproof jacket? **(comparative testing)**

Books:

- Traction Man (What would Traction Man use to build our school?) - Mini Grey
- Suzy Orbit Astronaut - Ruth Quayle
- The Sea of Stories - Sylvia Bishop
- The Princess and the Pea (*How could we help the Princess go to sleep with fewer mattresses?*)
- Hansel and Gretel (Are sweets a good option to build a house?

Year Three

Y3 - Animals including humans.

Key Essential Knowledge

- The skeleton protects our internal organs, keeps us supported and helps us move.
- Skeletons move because bones are attached to muscles. When a muscle contracts (bunches up), it gets shorter and pulls up the bone it is attached to. When a muscle relaxes, it goes back to its normal size.
- To keep your body fit and healthy you need a balanced diet using all of the food groups.
- Carbohydrates – Main source of energy for our bodies (rice, potatoes, pasta and bread).
- Protein – Repairs and builds muscles, organs and immunity (fish, meat, eggs and cheese).
- Sugar and Fats – Stored for energy and creates a layer of fat to keep us warm. Should not have too much of these (chocolate, sweets, butter, oil, cream).
- Vitamins and Minerals – Keeps us growing and fighting infections (fruit and vegetables).

Terminology

skeleton, muscles, joint, bones, carbohydrate, protein, vitamins, minerals, fats, nutrition.

Scientific Enquiry

- Identifying and grouping animals with and without skeletons **(grouping and classifying)**
- *"What nutrients does our body need?"* **(researching using secondary sources)**
- *"Does doing lots of sports make you fitter?"* **(pattern seeking)**
- *"Do male humans have larger skulls than female humans?"* **(pattern seeking)**

Books

- The funny bones- Janet and Allan Ahlberg
- The Lucky Escape- Dr. Heather Manley

Y3 - Plants

Key Essential Knowledge

- Plants need air, water, sunlight, nutrients from the soil, room to grow, sustainable temperature. The amount of each of these may vary depending on the type of plant.
- During transportation water is absorbed from the soil by the roots. It is then transported from the roots to the stem and then to the rest of the plant. Leaves use this water to make food.
- There are 3 main ways that plants reproduce: pollination, fertilisation and seed dispersal.
- During pollination pollen is carried by insects or blown by the wind from one flower to another.
- During fertilisation pollen sticks to the flower and then travels to the ovary where it fertilises egg cells (ovules) to make seeds.
- During seed dispersal the seeds are scattered by animals or the wind.

Terminology

flower, leaves, stem, trunk, petals, roots, nutrients, pollination, seed formation, seed dispersal, reproduction, transportation

Scientific Enquiry

- "How is water transported in plants?" Putting cut up flowers/ lettuce into coloured water and observing transportation of water **(observation)**
- "Do bigger plants grow from bigger seeds?" **(pattern seeking)**
- *What colour flowers do pollinating insects prefer?* **(pattern seeking)**

Books

- The Animals of Farthing Wood - Colin Dann
- The Night Gardener - Terry Fan
- Tom's Midnight Garden - Philiipa Pearce
- The Last Tree - Emily Haworth Boot

Y3 - Rocks

Key Essential Knowledge

- A fossil is the remains or the impression left by a prehistoric plant or animal embedded in rock.
- Sedimentary rocks are formed by sediment that is deposited over time, usually as layers at the bottom of lakes and oceans. The sediment is compressed over a long period of time before consolidating into solid layers of rock.
- Igneous rocks are very hard, dark and heavy. They are formed when molten magma from a volcano cools down.
- Metamorphic rocks are rocks which have been changed over time by pressure or heat.
- Soil is made from air, organic matter, water and minerals.

Terminology

fossil, soil, crystal, sedimentary, metamorphic, igneous, hard rocks, soft rocks, minerals, permeable, impermeable

Scientific Enquiries

- Classifying rocks according to whether they have grains or crystals **(grouping and classifying)**
- *"How are fossils formed?"* **(researching using secondary sources)**

Books:

- Ballet Shoes (fossil connections) - Noel Streatfield
- The Street Beneath my Feet - Charlotte Guillian

Y3- Light

Key Essential Knowledge and Skills

- The sun, light bulbs and candles are sources of light. We can see light sources shining directly into our eyes .
- To see other objects, light from a source must first shine on the object and then be reflected into our eyes .
- Dark is the absence of light. We cannot see anything in complete darkness.
- Shadows are formed on a surface when an opaque or translucent object is between a light source and the surface and blocks some of the light.
- The size of the shadow depends on the position of the source, object and surface.

Terminology

light, light source, dark, reflection, reflective, mirror, shadow, opaque, transparent, translucent

Scientific Enquiries

- Which pair of sunglasses is most effective? **(comparative test)**
- What happens to shadows when the light source moves? **(pattern seeking)**

Books

- Orion and the Dark - Emma Yarlett
- Peter Pan - J.M. Barrie
- The Little Match Girl - Hans Christian Andersen

Y3- Forces and magnets

Key Essential Knowledge and Skills

- Gravity is the force that pulls things to the ground. Gravity also holds Earth and other planets in their orbits around the sun.
- Friction is a force between two surfaces that are sliding or trying to slide across each other. Friction works in the opposite direction to which the object is moving. It slows down the moving object.
- Magnets are objects or materials that produce a magnetic field and attract or repel magnetic objects.
- Magnets have 2 poles: north and south.
- Not all materials are magnetic.

Terminology

attract, repel, magnetic pole, friction, poles, push, pull

Scientific Enquiries

- Which shoe/ surface is the most slippery? **(comparative test)**
- If I change the car, what happens to the distance travelled? **(comparative test)**

Books

- The Iron Man - Ted Hughes
- The Tin Snail - Cameron McAllister

Year Four

Y4 - Animals Including Humans

Key Essential Knowledge and Skills

- Many organs are involved in the process of digestion which softens food so that it can pass through the body. As it moves through the body the nutrients which are required to keep us healthy and have energy are absorbed into the body.
- Teeth are used for cutting and chewing food. They start the digestive process which gives us the energy we need to live.
- There are 4 different types of teeth: molars, premolars, incisors and canines, and they all have different functions.
- The teeth of an animal are designed to eat different foods depending on the diet of the animal.
- Food chains are the connections between producers, prey and predators. All the living things in a food chain rely on each other.

Terminology

predators, prey, producers, carnivores, omnivores, herbivores, organ, digestion, decay, molars, canines, incisors, oesophagus, stomach, small intestine, large intestine, pancreas

Scientific Enquiries

- *Which liquid decays our teeth the most?* Eggs in liquid investigation **(comparative test)**
- Grouping and classifying the teeth of carnivores and herbivores **(grouping and classifying)**
- *Are foods that are high in energy always high in sugar?* (pattern seeking)

Books

- Watership Down (food chains)- Richard Adams
- The Incredible Journey (food chains) - Sheila Burnford
- The Incredible Book-Eating Boy - Oliver Jeffers

Y4 - Living things and their habitats

Key Essential Knowledge and Skills

- All living things, which can also be called organisms, have to do certain things to stay alive. these are the life processes.
- Living things can be grouped according to different criteria—where they live, what type of organism they are, what features they have.
- A classification key is a tool that uses yes/no questions.
- Habitats can change throughout the year and this can have an effect on the plants and animals living there.
- Humans can have positive effects on the environment, e.g. nature reserves, but instead often damage it.

Terminology

organism, mammal, amphibian, reptile, bird, fish, vertebrate, invertebrate, deforestation, flowering, non-flowering, habitat, micro-habitat, sensitivity, respiration, excretion, nutrition.

Scientific Enquiries

- using and making simple guides or keys to explore and identify local plants and animals **(researching using secondary sources)**
- grouping plants and animals in environment **(identifying and classifying)**
- researching the effects of deforestation **(researching using secondary sources)**

Books

- Wolves - Emily Gravet
- The clue is in the poo (links to habitats) - Andy Seed

- The promise - Nicola Davies

Y4 – Sound

Key Essential Knowledge and Skills

- Sound is a thing that can be heard. The object that makes the sound is called a source.
- When objects vibrate, a sound is made. The vibration makes the air around the object vibrate and the air vibrations enter your ear. These are called sound waves.
- Sound waves travel to the ear and make the ear drum vibrate. Messages are sent to the brain which recognises the vibrations as sound.
- High pitched sounds are created by short sound waves.
- Low pitched sounds are created by long sound waves.
- The closer you are to the source, the louder the volume will be.
- The further away you are from the source, the quieter the sound will be.

Terminology

source, pitch, volume, vibration, frequency, outer, middle and inner ear, cochlea, hammer, auditory nerve, insulation

Scientific Enquiries

- "Which milk bottle makes the highest pitch sound?" **(pattern seeking)**
- "Which material makes the best ear-muffs?" **(comparative test)**

Books

- The Pied Piper – Emma Chicester Clark
- Julia Donaldson - Poems to perform
- Peter and the Wolf - Sergei Prokofiev
- Sleeping Beauty (What could penetrate the walls of the castle?)
- Rain dance poem - Victoria Reome
- Cynthia in the Snow - Gwendolyn Brookes

Y4 - Electricity

Key Essential Knowledge and

- Common appliances that use electricity are toasters, lamps, kettles, laptops, games consoles, phones, torches, TVs, washing machines and irons. Some appliances use batteries and some use mains electricity.
- In a series circuit all the components are joined together and the electricity can only flow in one direction.
- Many metals, such as copper, iron and steel, are good electrical conductors. That is why the parts of electrical objects that need to let electricity pass through are always made of metal.
- Plastic, wood, glass and rubber are good electrical insulators. That is why they are used to cover materials that carry electricity.

Terminology

electricity, electrical appliance, electrical circuit, electrical component, switch, conductor, insulator

Scientific Enquiries

- Testing whether different materials conduct electricity **(pattern spotting)**
- What happens when we add more bulbs to a circuit **(pattern spotting)**

Books

- The Boy who Harnessed the Wind- Bryan Mealer and William Kamkwamba
- The Magic School Bus and the Electric Field Trip- Joanna Cole

Y4 - States of Matter

Key Essential Knowledge

- There are 3 states of matter: solids, liquids and gases.
- Solid materials hold their shape. Their particles are closely packed and form a regular pattern. Their shape is fixed and they will always take up the same amount of space.
- Liquid materials hold the shape of the containers they are in and so can change shape. Their particles are close together but can move over each other.
- Gases can escape from open containers. They often cannot be seen. They have particles which can spread it and move in all directions.
- Water continually moves around the Earth in the water cycle
- Warming solid ice makes it melt into liquid water.
- Adding more heat makes it evaporate, at 100°C, into steam (a gas).
- When it is cooled it condenses back into liquid water.
- If it is cooled to 0°C it freezes and forms ice.

Terminology

matter, solid, liquid, gas, freezing, melting, water vapour, condensation, precipitation, evaporation, transpiration

Scientific Enquiries

- Place ice cubes in a glass, observe and discuss what happens **(observation over time)**
- *Which type of chocolate melts the quickest?* **(fair test enquiry)**
- Grouping and classifying materials as solids, liquids or gases
- Record and measure the evaporation of a beaker of water over 2 weeks **(observation over time)**
- *How does the surface area of a container of water affect how long it takes to evaporate?* **(pattern seeking)**

Books

- The Rhythm of the Rain - Grahame Baker Smith
- Charlie and the Chocolate Factory- Roald Dahl
- Swallows and Amazons - Arthur Ransome
- Once Upon A Raindrop - James Carter
- The Tempest - William Shakespeare
- Rivers: A Visual History from River to Sea

Year Five

Y5 - Animals including habitats

Key Essential Knowledge

- The main stages in the human life cycle are new born, infancy, childhood, early adulthood, middle adulthood, and late adulthood.
- Gestation period is the process in which babies grow inside their mother's body before they are born.
- Gestation periods differ between species.
- Puberty is the change that happens in late childhood and adolescence where the body starts to change because of hormones.
- Some changes include growth in height, more sweat, hair growth on arms and legs, under the armpits and on genitals, and growth in parts of the body such as male genitals and breasts.

Terminology

foetus, infancy, adolescence, growth, gestation, hormones, life cycle, puberty, reproduction

Scientific Enquiries

- researching the gestation periods of other animals **(researching using secondary sources)**
- recording the length and mass of a baby as it grows **(researching using secondary sources)**
- *Is there a link between a mammal's size and the length of its gestation period?* **(pattern seeking)**

Books

- The Nowhere Emporium (link to human lifecycles)- Ross Mackenzie
- The 1000-Year-Old Boy - Ross Welford
- The Last Wild - Piers Torday
- Tarka the Otter - Henry Williamson

Y5 - Living things and their habitats

Key Essential Knowledge

- All living things go through 7 life processes: movement, respiration, sensitivity, growth, reproduction, excretion and nutrition.
- Reproduction is when an animal or plant produces one or more individuals similar to itself.
- Sexual reproduction requires two parents with male and female gametes (cells). It will produce offspring that is similar to but not identical to the parent.
- Asexual reproduction will produce offspring that is identical to the parent. It requires only one parent.
- Pollination occurs when pollen from the anther is transferred to the stigma by bees and other insects.
- The life cycles of mammals, birds, amphibians and insects have similarities and differences.
- One difference is that amphibians and insects go through the process of metamorphosis. This is when the structure of their bodies changes significantly as they grow.

Terminology

behaviourist, naturalist, life processes, stigma, stamen, sexual reproduction, asexual reproduction, pollination, germination

Scientific Enquiries

- Growing plants from cuttings, tubers and bulbs **(observation over time)**
- Producing a biography about a naturalist **(researching using secondary sources)**

- Compare this collection of animals based on similarities and differences in their lifecycle **(identifying, grouping and classifying)**

Books

- My Family and Other Animals - Gerald Durrell
- A year of Nature Poems - Joseph Coelho
- The Lost Spells - Robert Macfarlane
- Lost Words - Robert Macfarlane

Y5 - Forces

Key Essential Knowledge

- Forces are pushes and pulls. These forces change the motion of an object.
- Gravity is the force that pulls objects to the centre of the Earth.
- Air resistance pushes up on the parachute, opposing the force of gravity . This makes the parachute land more slowly.
- Water resistance is the friction that is created between water and an object that is moving through it.
- Some objects can move through water with less resistance if they are streamlined.
- Levers allow us to do heavy work with less effort . For example, trying to pick up a large heavy box is difficult, however if a lever is used it becomes much easier to move it.
- Pulleys also allow us to do heavy work - objects are attached to ropes and pulley wheels, and so instead of lifting heavy object upwards, we can pull on the pulley rope downwards.
- Gears are toothed wheels. Their 'teeth' can fit into each other so that when the first wheel turns, so does the next one. This allows forces to move across a surface.
- Springs can be stretched by pulling them or squashed by pushing them. The greater the force pulling or pushing the spring, the greater the force the spring uses to move back to its normal shape.

Terminology

friction, gravity, air resistance, water resistance, levers, pulleys, gears, parachute, Newton, streamlined

Scientific Enquiries

- Creating parachutes and investigating "How does the surface area of a parachute affect the time it takes to fall? **(fair test)**
- Do all objects fall through water in the same way? **(pattern seeking)**
- How does the surface area of a container affect the time it takes to sink? **(fair test)**

Books

- The Man Who Walked Between The Towers – Mordicai Gerstein
- A Sailing Boat in the Sky - Quentin Blake
- The Princess and the Glass Mountain

Y5 - Earth and Space

Key essential knowledge

- Planets are celestial objects that orbit a star like our solar system's Sun.
- Our solar system is currently believed to include eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. In 2006 Pluto was reclassified as a 'dwarf planet'.
- • The Sun is a hot ball of gas which is classified as a star. The Sun is placed at the centre of our solar system and makes life possible on Earth.
- The Moon is a celestial body which orbits the Earth. One orbit takes approximately a month (almost 28 days).
- We only see the part of the Moon that is lit by the sun which is why it appears to be different shapes at different times of the month.

- The moon is described as waxing as it gets larger from new moon to full moon. As the moon gets smaller from full moon to new moon it is described as waning.
- The Earth rotates on its axis, which stands on a 23.5˚ angle.
- The sun's rays hit the side of the Earth which faces the sun. This causes day and night. It takes the Earth 24 hours to make one complete spin on it's axis.
- The Earth orbits the Sun. One orbit takes 365 days (a year
- Gravity is the pulling force acting between the Earth and other planets.

Terminology

orbit, solar system, astronomy, planet, rotation, spherical, crescent moon, gibbous moon, eclipse, lunar, heliocentric, waxing, waning

Scientific Enquiries

- Is there a pattern between the size of a planet and the time it takes to travel around the sun? **(pattern spotting)**
- researching evidence of life in space or Apollo missions **(researching using secondary sources)**

Books

- Cosmic – Frank Cottrell Boyce
- Balloon to the Moon - Gill Arbuthnott

Y5 - Properties and changes of materials

Key essential knowledge

- An electrical conductor lets electricity pass through it. They are often metal (e.g. iron, copper and gold) but also include carbon and water.
- An insulator doesn't let electricity pass through it, e.g. wood, leather, plastic.
- When the particles of a solid mix with the particles of a liquid, this is called dissolving. The result is a solution.
- Some materials can be separated after they have been mixed based on their properties - this is called a reversible change.
- Some methods of separation include the use of a magnet, a filter (for insoluble materials), a sieve (based on the size of the solids) and evaporation.
- When a mixture cannot be separated back into original components, this is called an irreversible change.

Terminology

solution, soluble, insoluble, dissolve, conductor, conductivity, insulator, filtering, separate, reversible, irreversible

Scientific Enquiries

- "Which nappy is the most absorbent?" **(fair test)**
- Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains? **(comparative test)**
- Grouping objects into transparent, translucent and opaque materials **(identifying, grouping and classifying)**

Books

- George's Marvellous Medicines - Roald Dahl
- The Wizards of Once - Cressida Cowell

Year Six

Y6 - Animals including humans

Key essential knowledge

- The circulatory system is made up of the heart, lungs and blood vessels.
- Arteries carry oxygenated blood from the heart to the rest of the body.
- Veins carry deoxygenated blood from the body to the heart.
- Nutrients, oxygen and carbon dioxide are exchanged via the capillaries.
- The heart is composed of four chambers; the right atrium, the right ventricle, the left atrium and the left ventricle.
- Exercise helps to improve health by: removing fatty deposits from the body, toning muscles and reducing fat, and increasing fitness (ability to do high intensity activities for longer).
- When we exercise out pulse rate increases because our muscles are working hard and need more oxygen.
- Tobacco can cause short-term effects such as shortness of breath and loss of taste and long term effects such as lung disease and cancer.
- Alcohol can cause short term effects such as addiction and long term effects such as organ damage and cancer.

Terminology

circulatory system, veins, arteries, capillaries, heart rate, pulse, blood vessels, red blood cells, white blood cells, platelets, calories.

Scientific Enquiries

- Investigating and measuring pulse rate during exercise **(pattern seeking)**
- Conducting research about diet and drugs **(researching using secondary sources)**
- Investigating a Pig's heart **(researching using secondary sources)**

Books

- Pig Heart Boy - Malorie Blackman
- Fastest Boy in the World - Elizabeth Laird

Y6 - Living things and their habitats

Key essential knowledge

- Carolus Linnaeus is the father of taxonomy, which is the system of classifying and naming organisms.
- One of his contributions was the development of a hierarchical system of classification of nature. This system includes eight taxa: domain, kingdom, phylum, class, order, family, genus, and species.
- All plants are included in one Kingdom (Plantae) which is then broken down into smaller and smaller divisions based on several characteristics
- Non-flowering plants can be broken down into mosses, ferns and conifers.
- Micro-organisms are invisible to the naked eye, you need a powerful microscope to see them.
- Micro-organisms are vital for life on Earth. They generate oxygen, are part of the carbon and nitrogen cycles, and can survive the harshest conditions.
- A classification key is a set of questions about the characteristics of living things.

Terminology

micro-organism, species, fungi, bacteria, algae, classification, taxonomy

Scientific Enquiries

- Using keys and computer programmes to classify a range of living things **(grouping and classifying)**
- Research unfamiliar animals and plants and decide where they belong on a classification key. Researching the work of Carl Linnaeus. **(researching using secondary sources)**
- Do all flowers have the same number of petals? **(pattern spotting)**

Books

- The Children of the New Forest - Frederick Marryat
- The Boy in the Tower- Polly Ho-Yen
- Cayote Summer - Mimi Thebo
- The Dreamfighter and other Creation Tales - Ted Hughes
- Cats - T.S Elliot
- Tyger, Tyger- William Blake

Y6 - Evolution and inheritance

Key Essential Knowledge

- Fossils are the remains of living things which are found in layers of rock. They tell us about living things that inhabited the earth millions of years ago and help us to understand the process of evolution.
- Animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.
- Charles Darwin's theory of evolution explains how every living thing is connected in a family tree that stretches back billions of years to the beginning of life on Earth.
- Variation between individuals in a species can be caused by inheritance or environmental factors.
- Variation in offspring over time can make animals and plants more or less able to survive in particular environments.

Terminology

inheritance, characteristics, variation, DNA, adaptation , palaeontologist, descendants, breeding, offspring, selective breeding.

Scientific Enquiries

- Bird beak buffet - Are there any patterns between birds' beaks and the foods they eat? **(pattern spotting)**
- Compare the skeletons of apes, humans, and Neanderthals – how are they similar, and how are they different **(identifying, grouping and classifying)**
- Can you classify these observations into evidence for the idea of evolution, and evidence against? **(identifying, grouping and classifying)**

Books

- Wonder (Does everybody look the same?) - R.J Palacio
- Charles Darwin On the Origin of the Species - Sabina Radeva
- Harry Potter (explore magical inheritance)
- What Mr Darwin Saw - Mick Manning
- One Smart Fish - Chris Wormell

Y6 - Light

Key Essential Knowledge

- Light is a form of energy made up of photons, which allows us to see things.
- Light travels very quickly and appears to travel in straight lines (rays) but when passing through transparent materials such as water and glass, light bends or turns – known as refraction.
- We see through our eyes, which are organs that take in light and images and turn them into impulses that our brain can understand.
- We can see things because light either comes from an object—a light source—or is reflected by an object in straight lines.
- Light rays reflect (bounce) off objects and into our eyes, allowing us to see.
- Light is made of many different colours (white light), known as the spectrum.

- When light hits an object, some of the colours are absorbed by the object and some are reflected. The enables us to see objects in different colours.

Terminology

light wave, concave, convex, filters, lens, retina, cornea, iris, pupil

Scientific Enquiries:

- Investigating the effect of different light sources and objects and the shadows produced **(comparative tests)**
- How do shadows change during the day? **(observation over time)**
- How does the angle that a light ray hits a plane mirror affect the angle at which it reflects off the surface? **(fair test)**

Books

- Walkabout - James Vance Marshall
- The White Darkness - David Grann

Y6 – Electricity

Key Essential Knowledge

- We use scientific symbols to represent the components (parts) of a circuit.
- The brightness of a bulb or the loudness of a buzzer is affected by the number of cells in a circuit.
- The brightness of a bulb or the loudness of a buzzer is affected by the voltage of cells in a circuit.
- The number of components in a circuit can affect how they function.
- The arrangement of components in a circuit can affect how they function.
- The length of wires in a circuit can affect how the components function.

Terminology

socket, parallel circuit, series circuit, volts, current, lux

Scientific Enquiries

- Systematically identifying the effect of changing one component at a time in a circuit **(fair testing)**
- How would you group electrical components and appliances based on what electricity makes them do? **(identifying, grouping and classifying)**

Books:

- Carrie's War - Nina Bawden
- Harry Potter - J.K Rowling

4.4.22- Updated. Year 6 key knowledge and skills added (Evolution and inheritance)

5.4.22- Year 4 key knowledge and skills added (electricity)

18.5.22- Added key knowledge for Years 1-2

19.5.22- Added key knowledge for Years 3-6.