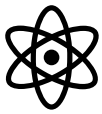
Science at Holy Trinity CE Primary

"The important thing is to never stop questioning." *Albert Einstein*



Our curriculum intent for science is that every child will:

- Be curious about the world around them and ask questions about scientific phenomenon
- Develop their own ideas and understanding in order to make sense of the world we live in
- Develop and acquire the scientific knowledge needed to understand the wider uses and implications of science in the world today
- Have opportunities to work practically, using scientific equipment which is appropriate to their age
- Have opportunities to meet real scientists who can share their knowledge and love of the subject

Implementation of the Science Curriculum at Holy Trinity

Holy Trinity is committed to ensuring all children have full access to a high-quality science education. This includes not just learning scientific knowledge, but also learning to work in a scientific manner. We have a range of scientific resources to support children in their learning, but also have links with Charters School, whose science department loan us their equipment too. The school also makes good use of our extensive outdoor grounds to give children opportunities to explore practical, real life science, whether it is learning about plants and animals or forces!
Our topic curriculum allows for meaningful Science links to be made across other subjects.

Impact of the Science Curriculum at Holy Trinity

Children have developed an enthusiasm and curiosity for the world we live and are confident to question and make scientific enquiries to find answers and solutions. During their time at Holy Trinity, children have confidently been engaged and enjoyed science lessons that have been progressive, diverse and have continued to build on essential knowledge.

The Curriculum is largely focused around 4 key areas:

	KS1	Lower KS2	Upper KS2
Working scientifically	• Making predictions • Asking and answering scientific questions • Making close observations • Identifying and classifying materials, animals, plants etc. • Performing simple tests • Gathering and recording data	• Asking and answering relevant questions • Setting up practical enquiries, comparative and fair tests. • Making systematic and careful observations • Take accurate measurements • Recording data using drawings, diagrams, bar charts and tables • Using scientific equipment such as thermometers, data loggers • Making explanations based on findings and observations • Using correct scientific language • Identifying similarities and differences and changes • Can use scientific evidence to answer questions	• Plan their own scientific enquiries in order to answer a question • Take accurate measurements using scientific equipment • Record increasingly complex data using tables, bar charts, scatter graphs and line graphs • Use test results to set up further tests • Consider reliability of results
Biology	• Types of animals • Parts of animals (including humans) • Feeding and exercise • Habitats • Plants and growing	• How animals (including humans) move and feed • Human nutrition • Grouping living things • Parts of a plant • What plants need	• Life cycles • Human bodies (circulation, transport of water and nutrients) • Classifying living things

Chemistry	• Comparing materials • Identifying materials • Uses of materials • Pushes and pulls	• Rocks and soils • Changes of state, including the water cycle	• Properties of materials, including thermal and electrical conductors • Separating mixtures • Changes of state (liquid to a gas etc)
Physics	• Changing seasons	• Electricity • Sound • Magnets and forces • Light and shadow	• Earth and space • Forces • Changing electrical circuits • Light and sight

How does Science fit into our School Vision?

Science links/actions:
• Ensure that staff are well supported in understanding the need for safe practice, especially in practical science lessons. • Ensure that the equipment and technology that is used is off a high standard and that children use equipment which is appropriate for the age and level of scientific working
• Provide CPD for staff in science National Curriculum • Ensure resources are available and of a high standard to allow teachers and other staff to teach high quality science lessons • Use specialist agencies to enhance our science curriculum and provide ideas for enriching lessons.
• Ensure pupils have access to high quality scientific equipment • Ensure pupils have access to the excellent outdoor learning environment we have at Holy Trinity Primary School • Be aware of new technologies that would engage and inspire pupils
• Approach local companies to offer sponsorship/funding for the purchase of new equipment • Explore new ideas for trips and visitors within and from the local community who can support with the science curriculum • Link with Charters and The Marist to enquire about support from students/with resources and learning • Link with Charters maintained to continue to loan of scientific equipment • Forge links with other Science subject leaders across the local cluster • Organise science events and days within the local cluster

Holy Trinity CE Primary Science overview

	Autumn	Spring	Summer
EYFS	**The Natural World:** • explore the natural world around them, making observations and drawing pictures of animals and plants. • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.		
	Year 1 Science Knowledge Organisers		
Year 1	**EVERYDAY MATERIALS** **End Task:** **Pupils will know:** • An object is something you can touch. • **Material is what an object is made from.** • **How to recognise different materials and name them.** • Which words to use to describe materials. **Pupils will be able to:** • Compare and group together a variety of everyday materials on the basis of their simple physical properties. • Explain why an object is made from a certain material. **Key Vocabulary:** • Material • Property • Wood • Plastic • Glass • Metal • Water • Rock • Hard • Soft • Rough • Smooth	**ANIMALS, INCLUDING HUMANS** **End Task:** **Pupils will know:** • What a mammal is. • What an amphibian is. • What a bird is. • What a fish is. • What a reptile is. • **What different animals eat** and that we label that **carnivore, herbivore and omnivore**. • The **five senses are: sight, smell, touch, hearing and taste.** • Know the different parts of the body associated with the senses. **Pupils will be able to:** • Describe and compare a variety of common animals using specific vocabulary. **Key Vocabulary:** • Mammals: warm-blooded, fur, give birth, have lungs • Amphibians: happy on land or water, lay eggs, breathe under water, smooth skin, cold-blooded (they become the same temperature as their surroundings) • Birds: lay eggs, have beaks, feathers, 2 legs and 2 wings, not all birds can fly, have lungs and breathe air, warm-blooded	**PLANTS** **End Task:** labelled diagram of a flowering plant Classifying trees in Forest School **Pupils will know:** • **All trees and flowers are plants.** • Know that some trees are deciduous and some are evergreen. • Some trees and plants trees change through the seasons. • **Basic structure of a flower and tree** **Pupils will be able to:** • Eg **Key Vocabulary:** • Deciduous • Evergreen • Trees • Flowers • Seeds • Stem • Roots • Leaves • Branches • Flower • Seeds • Fruit

	• Shiny • Transparent	• Fish: don't have legs, live in water, don't breathe air, have gills, most fish lay eggs, have scales • Reptiles: not slimy but have dry, scaly skin, some give birth to live young but most lay eggs, cold-blooded, have lungs and breathe air • Carnivores: eat meat • Herbivores: aet plants • Omnivores: eat meat and plants • Senses: touch, sight, smell, hearing, taste • Human body: head, neck, arms, feet, mouth, hands • Human body and senses: eyes, nose, ears, mouth, tongue, lips	
	SEASONAL CHANGES **End Task:** Autumn and Winter scenes Link to computing **Pupils will know:** • **The four seasons and the order they come in.** • **What the typical weather is like in the four seasons.** **Pupils will be able to:** • Describe the four seasons **Key Vocabulary:** • Autumn • Winter • Spring • Summer • Seasons • Month • Weather • Temperature • Length of day	**SEASONAL CHANGES** **End Task:** Spring scene Link to art **Pupils will know:** • **The four seasons and the order they come in.** • **What the typical weather is like in the four seasons.** **Pupils will be able to:** • Describe the four seasons **Key Vocabulary:** • Autumn • Winter • Spring • Summer • Seasons • Month • Weather • Temperature • Length of day	**SEASONAL CHANGES** **End Task:** Summer scene Link to seaside art **Pupils will know:** • **The four seasons and the order they come in.** • **What the typical weather is like in the four seasons.** **Pupils will be able to:** • Describe the four seasons **Key Vocabulary:** • Autumn • Winter • Spring • Summer • Seasons • Month • Weather • Temperature • Length of day

Working Scientifically in Year 1:

- **Making predictions**
- Asking and answering scientific questions
- Making close observations
- Identifying and classifying materials, animals, plants etc.
- Performing simple tests
- **Gathering and recording data**

Key Vocabulary (Working Scientifically Y1)

- experience
- observe
- changes
- patterns
- grouping
- sorting
- classifying
- compare
- identify (name)
- data
- measure
- record
- equipment
- questions
- test
- investigate
- explore
- magnifying glass / hand lens
- same
- different

Year 2 Science Knowledge Organisers

Year 2

USE OF EVERYDAY MATERIALS

End Task: Testing best material for Little Red Reading Hood's raincoat.

Pupils will know:

- **Why objects are made from certain materials.**
- The shapes of some solid objects can be changed.

Key Vocabulary:

** Check retention of Y1 vocab and essential knowledge before commencing Y2 unit*

Y1 key vocab plus:

- Fit for purpose
- Properties
- Use of material
- Squashing
- Twisting
- Bending
- Stretching
- Elastic

ANIMALS, INCLUDING HUMANS

End Task: balanced food plate, link to leaflet writing 'being healthy' in English, info book for Reception on animals and their babies
Butterfly life cycle diagram

Pupils will know:

- **That animals have offspring which grow into adults.**
- **What basic needs animals have for survival (water, food and air).**
- How important exercise is for humans.
- **How important eating the right amounts of different types of food is for humans.**
- How important personal hygiene is (washing, cleaning teeth).

Key Vocabulary:

- Life cycle
- Offspring
- Young
- Baby
- Child
- Teenager
- Adult
- Elderly
- Fruit
- Vegetables
- Portions
- Healthy
- Exercise
- Heart rate
- Hygiene

LIVING THINGS AND THEIR HABITATS

End Task:

Pupils will know:

- How to identify what is alive, dead or never been alive.
- **How a habitat provides the basic needs of the animals that live there** (polar, ocean, woodland, rainforest, urban, desert, coastal, pond)
- Where animals get their food from.

Key Vocabulary:

- Dead
- Living
- Non-living
- Habitats
- Microhabitat
- Food chain
- Source of food
- Producers
- Consumers
- Predators
- Prey

PLANTS

End Task: Fair test for growing a bean plant.

Pupils will know:

- **What a plant needs to grow.**

			• How a plant stays healthy **Key Vocabulary:** **Check retention of Y1 vocab and essential knowledge before commencing Y2 unit* • Lifecycle • Water • Air • light
	Working Scientifically in Year 2: • **Making predictions** • Asking and answering scientific questions • Making close observations • Identifying and classifying materials, animals, plants etc. • **Performing simple tests** • **Gathering and recording data**	**Key Vocabulary (Working Scientifically Y2)** • experience • observe • changes • patterns • grouping • sorting • classifying • compare	• identify (name) • data • measure • record • equipment • questions • test • investigate • explore • magnifying glass / hand lens • same • different
	Year 3 Science Knowledge Organisers		
Year 3	**ROCKS AND SOIL** **End Task:** Writing to inform about the different types of rocks and their properties. **Pupils will know:** • **All rocks are not the same.** • What the different rocks are and how are they different. • That rocks change. • Some rocks permeable. • **How are fossils formed.** • **That soil is the upper layer of earth** in which plants grow, a black or dark brown material typically consisting of a mixture of organic remains, clay, and rock particles: **Key Vocabulary:** • rock • soil	**FORCES AND MAGNETS** **End Task:** Writing to explain about magnetism. **Pupils will know:** • How objects move or change shape. • The type of surface affects how an object moves on it. • **That magnets are objects that are capable of producing a magnetic field.** • **Magnets are metals that attract other metals.** • **Magnetic materials are always made of metal but not all metals are magnetic**. • Magnetic metals include iron, steel, nickel and cobalt • **Materials that produce a magnetic field create a pushing or pulling force.** • Magnets have varying strength. • **Same poles repel.** • **Different poles attract**.	**PLANTS** **End Task:** Diagram on the roles of each part of a flowering plant. **Pupils will know:** • **What each part of a food plant does.** • **What each part of a flowering plant does.** • What plants need to grow. • Not all plants need the same conditions to flourish. • What happens when you water a plant. • **How seeds turn into plants.** • How plants reproduce. **Key Vocabulary:** **Check retention of Y1 and Y2 vocab and essential knowledge before commencing Y3 unit* • Pollination • Life cycle • Seed

- fossil
- organic matter
- grains
- crystals
- sedimentary rock

LIGHT

End Task:
Creating a shadow puppet theatre. How does the distance between a shadow puppet and a light source affect the size of the shadow?

Pupils will know:
- **Where light comes from.**
- We are able to see things due to the presence of light.
- Who Ibn Al-Haytham was and what he contributed to science.
- **What reflections are.**
- Why we need to protect our eyes from sunlight.
- **Shadows are formed because light can't pass through opaque objects.**
- That not all materials cast shadows.
- Why shadows change.

Key Vocabulary:
- Opaque
- Transparent
- Translucent
- Reflect
- Light source
- light
- dark (absence of light)
- shadow
- mirror
- reflective surface

Key Vocabulary:
- Force
- Magnet
- Magnetic
- Magnetic field
- Attract
- Repel
- North pole
- South pole
- Iron
- Steel
- Nickel
- Cobalt
- move
- movement
- surfaces
- push
- pull
- contact
- distance
- magnet
- bar magnet
- ring magnet
- horseshoe magnet
- repel
- poles (of magnets)
- magnetic materials

Sir Isaac Newton: in depth study of a scientist, sequencing significant events in history in relation to science.

- Roots
- Leaves
- Stem
- Flower
- Nutrients
- Carbon dioxide
- Photosynthesis
- Air
- Light
- Water
- Absorb
- Seed dispersal

ANIMALS, INCLUDING HUMANS

End Task: Baking a savoury tart (link with DT)

Pupils will know:
- Different food types.
- **How to eat a health balanced diet.**
- Animals (including humans) get their energy from the food they eat.
- **How our skeletons protect us and provide a frame.**
- Not all animals' skeletons are the same.
- **How our muscles make us move and support us.**

Key Vocabulary:
- Skeleton
- muscles
- Protection
- Organs
- Joints
- Calcium
- Nutrition

Working Scientifically in Year 3:

- Asking and answering relevant questions
- **Setting up practical enquiries, comparative and fair tests.**

Key Vocabulary (Working Scientifically Y3)
- develop
- enquiry
- practical enquiry
- chart
- bar chart
- results
- predictions

	• Making systematic and careful observations • **Take accurate measurements** • **Recording data using drawings, diagrams, bar charts and tables** • Using scientific equipment such as thermometers, data loggers • Making explanations based on findings and observations • Using correct scientific language • Identifying similarities and differences and changes • Can use scientific evidence to answer questions	• fair test • comparative test • relationships • conclusion • accurate • thermometer • data logger • estimate • data • diagram • key (identifying) • table	• explanation • reason • similarity • difference • question • evidence • information • findings • criteria • values • properties • characteristics

Year 4 Science Knowledge Organisers

Year 4

SOUND

End Task: Create a musical instrument (link with DT)

Pupils will know:

**check pupils already know that hearing is one of their 5 senses*

- Sound is a type of energy.
- **Sounds are made when objects vibrate.**
- **The vibration makes the air around the object vibrate and the air vibrations enter your ear. You hear them as sounds.**
- Sounds travel through a medium (such as air, water, glass, stone or brick).
- The pitch of a sound is how high or low it is.

Key Vocabulary:

- Sound wave
- Pitch
- High
- Low
- Vibrations
- Vibrate
- Volume
- Insulation
- Amplitude
- Ear drum

ELECTRICITY

End Task: Make an Iron Man with a working electrical circuit for eyes.

LIVING THINGS AND THEIR HABITATS

End Task: link to Computing (classification key?)

Pupils will know:

** check pupils know Y1 knowledge*

- **Animals can be put into 2 categories:**
  1. **Vertebrates – animals with a backbone**
  2. **Invertebrates – animals without a backbone**
- Vertebrates can be grouped 5 ways (Fish, amphibians, reptiles, birds, mammals)
- Invertebrates can be grouped 4 ways (insects, arachnids, snails and slugs, worms)
- **Plants can be grouped 2 ways (flowering and nonflowering)**
- Some living things can only survive in certain habitats and are not able to adapt.
- Some living things can adapt to their environment.
- Humans are changing environments (e.g deforestation) which impacts on living things in that environment (man-made changes).

Key Vocabulary:

**Check retention of Y2 vocab and essential knowledge before commencing Y4 unit*

- environment
- non-flowering plants
- ferns
- mosses
- flowering plants

STATES OF MATTER Ensure Geography Learning 'Water Cycle' takes place before this unit.

End Task: Writing the journey of how water travels around our school on a daily basis.

Pupils will know:

- **Solids stay in one place and can be held. They do not flow like liquid** (some solids like sand or salt can be poured). **Solids always take up the same amount of space. They do not spread out like gases.**
- **Liquids can flow or be poured easily. They are not easy to hold. Liquids can change their shape depending on the container they are in.**
- **Gases are often invisible. Gases do keep their shape. They spread out and change their shape and volume to fill up whatever container they are in.**
- **Some materials change state when they are heated or cooled** and some of these changes can be reversed.
- Evaporation occurs when water turns into water vapour. This happens very quickly when the water is hot, like in a kettle, but it can also happen slowly, like a puddle evaporating in the warm air Everyday examples of evaporation: washing drying, water boiling, puddles evaporating on a hot day.
- Condensation is when water vapour is cooled down and turns into water. The water vapour in the air cools when it touches the cold surface.

Pupils will know:

- Electricity is an energy that is used to power items.
- **Electrical energy is caused by electrons (the particles in atoms) moving about to make a current**
- **In order for electricity to flow a circuit needs 3 things:**
  1. **A source of electricity**
  2. **No gaps in the circuit**
  3. **Conductors**
- By changing the components in a circuit we can change the brightness of the bulb/the volume of a buzzer
- **A conductor is a material that allows charges to flow easily throughout the material**. Metals are often good conductors. Examples include: silver, gold, copper, steel and salt water.
- **An insulator is a material that does not allow charges to flow easily throughout the material**. Examples include: rubber, glass, oil, diamond and dry wood.
- **Electricity can be dangerous** – water and electricity don't mix.

Pupils will be able to:

- Create an electrical circuit

Key Vocabulary:

- Electricity
- electrons
- simple circuit
- light bulb
- cell
- wire
- buzzer
- switch
- motor
- battery
- series circuit
- conductor
- insulator

- grasses
- vertebrate animals: fish, birds, mammals, amphibians, reptiles
- invertebrate animals: snails, worms, slugs, spiders, insects
- human impact – litter, deforestation, population increase, nature reserves

Everyday examples of condensation: water droplets forming inside windows or on a cold glass.

- Condensation and evaporation both happen within the water cycle.

Key Vocabulary:

- solid
- liquid
- gas
- temperature
- heat (heating)
- cool (cooling)
- water cycle
- evaporation
- condensation
- melting
- freezing

ANIMALS, INCLUDING HUMANS

End Task:

Pupils will know:
Digestive System

- **Digestion is the way the body breaks down the food we eat into smaller parts that can be used to give the body energy.**
- Main parts of the digestive system: Mouth, tongue, pharynx, oesophagus, liver, stomach, gallbladder, pancreas, large intestine, small intestine.
- The digestive journey of food:
  1. Humans put food in their mouth
  2. Food is chewed by the teeth
  3. Food is swallowed and passed through the pharynx and oesophagus to the stomach
  4. In the stomach it is smashed into a mixture like soup and mixed with acid
  5. The mixture passes into the small intestine, where tiny bits of food pass into the bloodstream
  6. The food that is left goes into the large intestine
  7. Finally, waste products leave the body

Teeth

			• Teeth grow in babies when they are about 6 months old • 20 teeth grow by the time you are about 2.5 years old • From about the age of 6 you start to lose teeth until about the age of 12 • These teeth are replaced by 32 permanent teeth • **Carnivores and herbivores have different types of teeth, to suit the type of food they eat.** • Herbivores have teeth which are shaped to squash and grind plants. • Carnivores have teeth which are shaped to slice and rip the meat they eat. • **Major causes of tooth decay are sugary, sticky foods and beverages.** The more sugar consumed, the more acid, which gets produced leading to decay. **Food Chains** • **A food chain is a diagram that shows a producer and consumers.** A consumer can be a predator, prey or both The arrow means 'is food for'. **Key Vocabulary:** • nutrition • diet • skeleton • muscles • protection • support • movement • bones • skull • shell • digestive system • stomach • small intestine • large intestine • oesophagus • types of teeth: molar, pre-molar, incisor, canine • saliva • food chain • producer • consumer

Working Scientifically in Year 4:

- **Asking and answering relevant questions**
- **Setting up practical enquiries, comparative and fair tests.**
- **Making systematic and careful observations**
- **Take accurate measurements**
- **Recording data using drawings, diagrams, bar charts and tables**
- **Using scientific equipment such as thermometers, data loggers**
- Making explanations based on findings and observations
- **Using correct scientific language**
- Identifying similarities and differences and changes
- Can use scientific evidence to answer questions

Key Vocabulary (Working Scientifically Y4)

- develop
- enquiry
- practical enquiry
- fair test
- comparative test
- relationships
- conclusion
- accurate
- thermometer
- data logger
- estimate
- data
- diagram
- key (identifying)
- table
- chart
- bar chart
- results
- predictions
- explanation
- reason
- similarity
- difference
- question
- evidence
- information
- findings
- criteria
- values
- properties
- characteristics

Year 5 Science Knowledge Organisers

Year 5

EARTH AND SPACE

English link – Cosmic by Frank Cottrell-Boyce and Mission to Mars

End Task:
Explanation Text on Sun, Moon and Earth

Pupils will know:

- **Names the 8 planets in our solar system in order.**
- **The Sun is a star.**
- **The Earth spins on its axis. It takes 24 hours to complete 1 rotation.**
- **The Earth takes 365 ¼ days to travel around the Sun.**
- **During the winter, the North Pole is tilted away from the Sun's rays.**
- **During the summer the North Pole is tilted towards to Sun's rays.**
- **This tilt creates the seasons.**
- Earth has one moon which is kept in orbit by gravity.
- The Moon orbits the Earth anti-clockwise and takes approx. 28 days.
- The Moon spins once on its axis every time it orbits Earth. This means that we only see one side of the Moon.

PROPERTIES AND CHANGES OF MATERIALS

End Task:

Pupils will know:
**Check retention of Y4 vocab and essential knowledge before commencing Y5 unit*

- **Different materials are used for particular jobs based on their properties:** electrical conductivity, flexibility, hardness, insulator, magnetism, solubility, thermal conductivity, transparency.
- **Reversible changes can be 'undone'.**
- **Irreversible changes cannot be 'undone'.**
- To separate materials you can sieve, filter or evaporate
- **Materials that will dissolve are known as soluble.**
- **Materials that won't dissolve are known as insoluble.**
- A solution is made when solid particles are mixed with liquid particles e.g. dissolving sugar in hot tea. The solid seems to disappear in the solution but it is still there – it has just become part of the liquid.

Key Vocabulary:

- solid
- liquid

LIVING THINGS AND THEIR HABITATS

End Task:

Pupils will know:
**Check retention of Y2 vocab and essential knowledge before commencing Y5 unit*

- **A life cycle shows how things are born, how they grow and how they produce.**

- Life cycle of a **mammal**:
Live young born → Grow from babies to adults →Reproduce → Live young born

- Life cycle of an **insect**:
Egg → Grow to adult or metamorphosis to adult →Reproduce → Egg

- Life cycle of a **bird**:
Egg → Grow to adult →Reproduce → Egg

- Life cycle of an **amphibian**:
Egg in water → Grow to adult →Reproduce → Egg in water

- The Moon has different phases depending on where it is in its orbit. The Moon's gravity causes high and low tides

Key Vocabulary:
- solar system
- planets: Mercury, Venus, earth, Mars, Jupiter, Saturn, Neptune, Uranus
- moon
- stars
- spherical bodies
- rotation
- orbit
- satellite
- gravity

FORCES

End Task:

Pupils will know:
**Check retention of Y3 vocab and essential knowledge before commencing Y5 unit*
- **Forces are pushes and pulls in a particular direction.**
- **Forces change the motion of an object. They will make it start to move or speed up, slow it down or even make it stop.**
- **Friction is a force between two surfaces that are sliding, or trying to slide, across each other.**
- **Friction always works in the direction opposite to the direction in which the object is moving, or trying to move.**
- **Friction always slows a moving object down**
- Water resistance and air resistance are forms of friction.
- **The force that pulls things to the ground on Earth** (and other planets) **is called gravity**. Gravity also holds Earth and the other planets in their orbits around the Sun.
- Mechanisms (levers, pulleys, gears and springs) help us to move objects.

Key Vocabulary:
- forces
- gravity
- gas
- temperature
- heat (heating)
- cool (cooling)
- water cycle
- evaporation
- condensation
- melting
- freezing

- **Reproduction: Living things create other living things. Animals have babies. Plants have seeds which turn into new plants.**

Reproduction in plants:
- Sexual reproduction (2 parents) When the pollen from one flower joins the egg of the new flower and a seed or many seeds are formed.
- Asexual reproduction (1 parent) This is when a small part of a plant breaks off and it starts to grow until it is the same size as the plant that it came from and this is repeated (flowers are needed).

Key Vocabulary:
- life cycles
- reproduction
- life processes
- sexual and asexual reproduction (plants)
- root cuttings
- classification
- microorganisms
- organisms

ANIMALS, INCLUDING HUMANS

End Task:

Pupils will know:
- there are 6 stages to human life cycle: embryo, foetus, baby, childhood, adolescence, young adult, middle aged adult, old age
- It takes a foetus (unborn baby) about 40 weeks to develop inside the womb. During that time the fertilised egg becomes an embryo, and then a foetus.
- **Puberty is the stage of development between childhood and adulthood. Changes happen inside and outside of the body during puberty. Physical growth occurs so that the body changes to that of an adult which enables reproduction.**

	• air resistance • water resistance • friction • levers • pulleys • gears • springs		**Key Vocabulary:** • Puberty • Gestation period (Link to RHSE)

	Working Scientifically in Year 5: • **Plan their own scientific enquiries in order to answer a question** • **Take accurate measurements using scientific equipment** • **Record increasingly complex data using tables, bar charts, scatter graphs and line graphs** • Use test results to set up further tests • Consider reliability of results	**Key Vocabulary (Working Scientifically Y5)** • variables • evidence • justify • accuracy • precision • scatter graphs • bar graphs • line graphs • argument (science) • causal relationship

Year 6 Science Knowledge Organisers

	ANIMALS INCLUDING HUMANS	LIGHT	LIVING THINGS AND THEIR HABITATS
Year 6	**End Task:** Non-chronological report about Blood and the Circulatory System. Link to Pig-Heart Boy English **Pupils will know:** **Check retention of Y4 vocab and essential knowledge on digestive system before commencing Y6 unit* **Circulatory System (the system that circulates blood through the body)** • **Deoxygenated blood flows into the heart from the body through the veins** • **This blood is pumped out to the lungs from the heart** • **Blood is then oxygenated in the lungs** • **The oxygenated blood is then pumped out of the heart to the organs of the body** • **The blood travels around the body delivering oxygen and nutrients to the organs** **Diet and lifestyle**	**End Task:** Link to Periscopes WW1 History **Pupils will know:** **Check retention of Y3 vocab and essential knowledge before commencing Y6 unit* • **Light travels in straight lines. When light hits an object, it is reflected (bounces off) and enters our eyes. This is how we see the object.** • **Rays of light travel from a light source** and hit objects around us. The rays of light reflect, or bounce, off an object, and then travel into our eyes. • This reflection of light allows us to see the object. • Light waves travel at a different speed when they go through other transparent materials, such as water or glass. This causes the rays of light to change direction and bend. This is known as refraction.	**End Task:** **Pupils will know:** **Check retention of Y4 & Y5 vocab and essential knowledge before commencing Y6 unit* • **Scientists sort and group living things according to their similarities and differences. This is called classification**. Scientists who classify living things are called taxonomists. • The five kingdoms of living things: 1. Plants 2. Monera 3. Protista 4. Fungi 5. Animals • **Microorganisms are very tiny living things**. They are so small that they are not visible to the naked eye, so a microscope is needed to see them.

- Fatty rich foods can clog arteries and veins, preventing blood from delivering what is needed.
- **Exercise can improve the health of a person by removing fatty deposits from the body**.
- Some exercises are called cardiovascular, and are designed to improve the fitness of the overall circulatory system by strengthening the organs and pulse rate.

Key Vocabulary:

- circulatory system
- heart
- lungs
- blood vessels
- blood
- lifestyle
- disease
- water transportation
- nutrient transportation
- oxygen
- air
- breathing
- exercise
- diet
- drugs

EVOLUTION AND INHERITANCE

End Task:

Pupils will know:

- **Evolution is the way that living things change over time**
- Know that living things used to look a lot different to how they do now. We know this because fossils have been found that show creatures that look a lot different to how they do today. Fossils show us that living things have changed over time.
- Charles Darwin observed that although individuals in a species shared similarities, they were not exact copies of each other. He noticed that there were small differences or

- Refraction creates illusions. Because light bends when it travels between air and water or glass, objects seen through these materials look bent or distorted.
- **Shadows are the shape as the objects which cast them because light travels in straight lines.**

Key Vocabulary:

**Check retention of Y3 vocab and essential knowledge before commencing Y6 unit*

- light sources
- periscope
- refraction

ELECTRICITY

End Task:

Link to Morse Code WW1 History

Pupils will know:

- **A series circuit has only one route for the current to take.** If more bulbs or buzzers are added, the power has to be shared and so they will be dimmer or quieter. **If just one part of this series circuit breaks, the circuit is broken and the flow of current stops.**
- **More batteries or a higher voltage create more power to flow through the circuit.**
- Fewer batteries or a lower voltage give less power to the circuit. **More buzzers or bulbs mean the power is shared by more components.**
- **Symbols for electric circuits.**

Key Vocabulary:

**Check retention of Y4 vocab and essential knowledge before commencing Y6 unit*

- voltage
- components
- symbols
- circuit diagram

- All microorganisms share similarities and differences, and can be classified using the Linnaean taxonomic system.

Key Vocabulary:

**Check retention of Y4 & Y5 vocab and essential knowledge before commencing Y6 unit*

- life cycles
- reproduction
- life processes
- sexual and asexual reproduction (plants)
- root cuttings
- classification
- microorganisms
- organisms

	variations between them .He also noticed that everything in the natural world was in competition. **The winners were those that had characteristics that made them better adapted for survival. He noticed that living things were more likely to reproduce and pass on their useful characteristics to their offspring**. Over time a species gradually changes. Given enough time these small changes add up to the extent a new species altogether can evolve. • **Adaptation is when things evolve to overcome challenges in their environment**. For example by adapting their behaviour • **Variation occurs to enable species to adapt and survive in their environment.** **Key Vocabulary:** • evolution • evolve • adaptation • variation • inherit • inheritance		
	Working Scientifically in Year 6: • **Plan their own scientific enquiries in order to answer a question** • **Take accurate measurements using scientific equipment** • **Record increasingly complex data using tables, bar charts, scatter graphs and line graphs** • **Use test results to set up further tests** • **Consider reliability of results**		**Key Vocabulary (Working Scientifically Y6)** • variables • evidence • justify • accuracy • precision • scatter graphs • bar graphs • line graphs • argument (science) • causal relationship

National Curriculum: Science

Purpose of study

A high-quality science education provides the foundations for **understanding the world** through the specific disciplines of **biology**, **chemistry and physics**. Science has **changed our lives** and is **vital to the world's future prosperity**, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational **knowledge and concepts**, pupils should be encouraged to **recognise the power of rational explanation** and develop a **sense of excitement** and **curiosity about natural phenomena**. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

Aims

The national curriculum for science aims to ensure that all pupils:

- develop **scientific knowledge and conceptual understanding** through the specific disciplines of biology, chemistry and physics
- develop **understanding of the nature, processes and methods** of science through different types of science enquiries that help them to **answer scientific questions** about the **world around them**
- are equipped with the scientific knowledge required to understand the uses and implications of science, **today and for the future.**

Subject Content

YEAR 1

Plants

- identify and name a variety of common wild and garden plants, including deciduous and evergreen trees
- identify and describe the basic structure of a variety of common flowering plants, including trees.

Animals, including humans

- identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals
- identify and name a variety of common animals that are carnivores, herbivores and omnivores
- describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)
- identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense

Everyday materials

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

Seasonal changes
- observe changes across the four seasons
- observe and describe weather associated with the seasons and how day length varies

YEAR 2

Living things and their habitats
- explore and compare the differences between things that are living, dead, and things that have never been alive
- identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other
- identify and name a variety of plants and animals in their habitats, including microhabitats
- describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food

Plants
- observe and describe how seeds and bulbs grow into mature plants
- find out and describe how plants need water, light and a suitable temperature to grow and stay healthy

Animals, including humans
- notice that animals, including humans, have offspring which grow into adults
- find out about and describe the basic needs of animals, including humans, for survival (water, food and air)
- describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene

Use of everyday materials
- identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses
- find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching

YEAR 3

Plants
- identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers
- explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant
- investigate the way in which water is transported within plants
- explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal
- identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers
- explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant
- investigate the way in which water is transported within plants
- explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal

Rocks

- compare and group together different kinds of rocks on the basis of their appearance and simple physical properties
- describe in simple terms how fossils are formed when things that have lived are trapped within rock
- recognise that soils are made from rocks and organic matter
- compare and group together different kinds of rocks on the basis of their appearance and simple physical properties
- describe in simple terms how fossils are formed when things that have lived are trapped within rock
- recognise that soils are made from rocks and organic matter

Light

- recognise that they need light in order to see things and that dark is the absence of light.
- notice that light is reflected from surfaces.
- recognise that light from the sun can be dangerous and that there are ways to protect their eyes.
- recognise that shadows are formed when the light from a light source is blocked by an opaque object.
- find patterns in the way that the size of shadows change.

Forces and Magnets

- compare how things move on different surfaces.
- notice that some forces need contact between two objects, but magnetic forces can act at a distance.
- observe how magnets attract or repel each other and attract some materials and not others.
- compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials.
- describe magnets as having two poles.
- predict whether two magnets will attract or repel each other, depending on which poles are facing.

Animals, including humans

- identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat.
- identify that humans and some other animals have skeletons and muscles for support, protection and movement.

YEAR 4

Living things and their habitats

- recognise that living things can be grouped in a variety of ways.
- explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.
- recognise that environments can change and that this can sometimes pose dangers to living things.

Animals, including humans

- describe the simple functions of the basic parts of the digestive system in humans.
- identify the different types of teeth in humans and their simple functions.
- construct and interpret a variety of food chains, identifying producers, predators and prey.

States of matter

- compare and group materials together, according to whether they are solids, liquids or gases.
- observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C).
- identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

Sound

- identify how sounds are made, associating some of them with something vibrating.
- recognise that vibrations from sounds travel through a medium to the ear.
- find patterns between the pitch of a sound and features of the object that produced it.
- find patterns between the volume of a sound and the strength of the vibrations that produced it.
- recognise that sounds get fainter as the distance from the sound source increases.

Electricity

- identify common appliances that run on electricity.
- construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.
- identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery.
- recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.
- recognise some common conductors and insulators, and associate metals with being good conductors.

YEAR 5

Living things and their habitats

- describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.
- describe the life process of reproduction in some plants and animals.

Animals, including humans

- describe the changes as humans develop to old age.

Properties and changes of materials

- compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.
- know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.
- use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.
- give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.
- demonstrate that dissolving, mixing and changes of state are reversible changes.
- explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

Earth and Space

- describe the movement of the Earth, and other planets, relative to the Sun in the solar system.
- describe the movement of the Moon relative to the Earth.
- describe the Sun, Earth and Moon as approximately spherical bodies.
- use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.

Forces

- explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.
- identify the effects of air resistance, water resistance and friction, that act between moving surfaces.
- recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.

YEAR 6

Living things and their habitats

- describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals.
- give reasons for classifying plants and animals based on specific characteristics.

Animals, including humans

- identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.
- recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.
- describe the ways in which nutrients and water are transported within animals, including humans.

Evolution and inheritance

- recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.
- recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.
- identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

Light

- recognise that light appears to travel in straight lines.
- use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye.
- explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes.
- use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

Electricity

- associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.
- compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.
- use recognised symbols when representing a simple circuit in a diagram.