Our Lady and St Anne's Subject Map: Science

Our Science learning journey:

YEAR 6

- **Light**
  Focusing on:
  - How light travels
  - How we see shadows
- **Electricity**
  Focusing on:
  - Describing circuits
  - Building circuits
- **Evolution and inheritance**
  Focusing on:
  - Evolution
  - Inherited characteristic
- **Living things and their habitats**
  Focusing on:
  - Classification
  - Microbes
- **Animals including humans**
  Focusing on:
  - Lifestyle choices and impact on body
  - Circulatory system

YEAR 5

- **Living things and their habitats**
  Focusing on:
  - Life cycles
  - Plant reproduction
- **Properties and changes of materials**
  Focusing on:
  - Solutions
  - Suitability of materials
  - Grouping materials according to properties
- **Earth and Space**
  Focusing on:
  - Movement of Earth, Moon and Sun
  - Day and night
- **Forces**
  Focusing on:
  - Types of forces
  - Machines and forces
- **Animals including humans**
  Focusing on:
  - Growing older
  - Puberty
  - Reproduction

YEAR 4

- **Electricity**
  Focusing on:
  - Series circuits and switches
  - Conductors and insulators
- **Sound**
  Focusing on:
  - How sounds are made
  - Exploring vibrations
- **States of matter**
  Focusing on:
  - Solids, liquids and gases
  - Changes in states of matter
- **Animals including humans**
  Focusing on:
  - Digestion
  - Construct and interpret food chains
- **Living things and their habitats**
  Focusing on:
  - Habitats
  - Environmental changes

YEAR 3

- **Animals including humans**
  Focusing on:
  - Human skeleton
  - Nutrition
- **Rocks**
  Focusing on:
  - Types of rock
  - How fossils are formed
- **Plants**
  Focusing on:
  - How water is transported in a plant
  - Life cycle of plants
- **Forces and magnets.**
  Focusing on:
  - Types of forces
  - Magnetic and non-magnetic materials
- **Light**
  Focusing on:
  - Sources of light
  - Shadows

YEAR 2

- **Living things and their habitats.**
  Focusing on:
  - Exploring and describing habitats
  - Simple food chains
- **Plants**
  Focusing on:
  - How plants grow
  - What plants need
- **Uses of everyday materials**
  Focusing on:
  - Changing shape of materials
  - How materials can be used
- **Animals including humans**
  Focusing on:
  - Growth and life cycles
  - Importance of exercise and healthy eating

YEAR 1

- **Animals including humans**
  Focusing on:
  - Parts of the body
  - Types of animals
- **Materials**
  Focusing on:
  - Naming, identifying and grouping everyday materials
  - Simple properties of everyday materials
- **Plants**
  Focusing on:
  - Simple parts of plants
  - Names of common plants
- **Seasons and weather.**
  A study over time looking at changes.

EYFS

- Look closely at similarities, differences, patterns and changes in nature
- Make observations of animals and plants and explain why some things occur, and talk about changes
- Know about similarities and differences in relation to places, objects, materials and living things
- Talk about the features of their own immediate environment and how environments might vary from one to another

Key components of our Science curriculum

1. Working Scientifically

In order for primary school children to operate as successful scientists, they should be taught a wide range of essential enquiry skills. These skills should build upon earlier opportunities they have had to play, explore, create, engage in active learning, and think critically in the Early Years Foundation Stage.

We refer to these skills as 'Working Scientifically', these are the qualities needed to act, think and work like a scientist. At Our Lady and St. Anne's, we want children to work like scientists by...

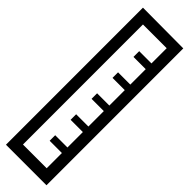
Asking questions

Planning and setting up different types of enquires

Performing tests

Identifying and classifying groups

Making observations and measurements



Using equipment

Gathering and recording data

Reporting, presenting and communicating data or findings

2. Conceptual Understanding

Pupils must develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics. This equips children with the scientific knowledge required to understand the uses and implications of science, today and for the future. At Our Lady and St. Anne's pupils will explore the following topics and are expected to answer the associated questions by the end of each unit.

Our key learning questions: ***Biology*** ***Chemistry*** ***Physics***

EYFS					
YEAR 1	**Animals including humans:** - What are the parts of the body? - What are our senses? - What different kinds of animals are there? - What do animals eat?	**Materials:** - Can you name some everyday materials? - What are some properties of everyday materials? - How can materials be grouped?	**Plants:** - What is a plant? - What are the different parts of a plant? - What are some different types of plants? - Where can plants live?	**Seasons and weather:** - What do you notice the Sun seems to do every day? - What are the name of the four seasons? - What season has the longest days/shortest days? - What is the weather like in each season?	
YEAR 2	**Animals including humans:** - What happens when we grow? - What do we need to live and be healthy? - Why is exercise important? - Why is it important to keep clean?	**Materials:** - How are some materials similar/different compared to others? - Can we change the shape of materials? - What are examples of solids, liquids and gases?	**Plants:** - What are the properties of the key parts of a plant? - How do plants grow? - What do plants need to grow? - Why are plants important for us?	**Living things and their habitats:** - What makes something living or non-living? - What is a habitat? How are living things suited to their habitat? - What is a food chain?	
YEAR 3	**Animals including humans:** - What do animals need to eat and stay healthy? - What is nutrition? - Why do we have a skeleton? - How do we move?	**Rocks** - What are the properties of a rock and how is it useful? - What are rocks made from? - What are the different types of rocks? - What are fossils and why do we find fossils in rocks?	**Plants:** - What are the key parts of a flowering plant? - What is the life cycle of a flowering plant? - What do plants require for life and to grow? - How is water transported in a plant?	**Light:** - What is light? - Where does light come from? - What is a shadow? - What is reflection?	**Forces and magnets:** - What is a force? - How can we move things? - What is a magnet and how does it behave? - Which materials are magnetic?
YEAR 4	**Animals including humans:** - What is a food chain and what can it tell us? - What are the parts of the digestion do? - Why do we have different types of teeth?	**States of Matter:** - What makes something a solid, liquid or a gas? - How can you change something from one states of matter to the other? - How does water change state during the water cycle?	**Living things and their habitats:** - How can we group living things? - What is classification? - How can habitats change? - What are dangers to living things in the environment?	**Sound:** - What is sound? - How does sound travel to our ears? - What state of matter does sound travel through best? - How can we change volume/pitch?	**Electricity:** - What is electricity and where does it come from? - How do we use electricity? - What is a circuit? - What is a switch? - What are conductors and insulators?
YEAR 5	**Animals including humans:** - What happens during puberty? - How does our body change when we become old? - What are the reproductive organs? - How are babies made?	**Properties and changes of material:** - How can we group materials by their properties? - How does a material's property suit its role? - What is a solution? - How can mixtures be separated?	**Living things and their habitats:** - How do life cycles differ between different groups of animals? - How does a plant reproduce? - What are the similarities and differences between plant and animal life cycles?	**Earth and Space:** - What is the solar system? - What shape are planets, stars and moons? - Why does the sun appear to move across the sky? - Why do we have day and night? - What are the moon's phases?	**Forces:** - What are contact/non-contact forces? - Why do things fall to the ground? - What are the effects of different forces? - What is a machine and how can they help us?
YEAR 6	**Animals including humans:** - Where are the most important organs in our bodies? - What are the parts of the circulatory system? - What does blood help to transport around the body? - How are our bodies impacted by lifestyle choices?	**Evolution and inheritance:** - Why are fossils so important? - How are living things adapted to their environment? - How do living things change? - What causes evolution?	**Living things and their habitats:** - How are plants and animals classified? - How might I classify plants and animals based on their characteristics? - What are microbes and where can we find them?	**Light:** - How does light travel? - What happens when light hits an object? - How can we see around corners? - How do shadows form?	**Electricity:** - How can I make a working series circuit? - How can I change how a circuit works? - What happens to energy as it moves around a circuit? - What are the correct symbols used in a circuit?

Unit overviews

EYFS	• Look closely at similarities, differences, patterns and changes in nature • Make observations of animals and plants and explain why some things occur, and talk about changes • Know about similarities and differences in relation to places, objects, materials and living things • Talk about the features of their own immediate environment and how environments might vary from one to another				
YEAR 1	**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.	**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.	**Plants:** - identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers	**Seasons and weather:** - observe changes across the four seasons - observe and describe weather associated with the seasons and how day length varies.	
YEAR 2	**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.	**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.	**Plants:** - 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	**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 micro- habitats - 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.	
YEAR 3	**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.	**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.	**Plants:** - 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.	**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.
YEAR 4	**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.	**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.	**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	**Animals including humans:** - describe the changes as humans develop to old age	**Properties and changes of material:** - compare and group together everyday materials on the basis of their properties, and response to magnets - know that some materials will dissolve in liquid to form a solution - use knowledge of solids, liquids and gases to decide how mixtures might be separated - give reasons for the particular uses of everyday materials - demonstrate that dissolving, mixing and changes of state are reversible changes - explain that some changes result in the formation of new materials,	**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.	**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	**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.	**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 micro- organisms, plants and animals - give reasons for classifying plants and animals based on specific characteristics.	**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.

Key:

Biology Chemistry Physics

Key scientists linked to each topic

YEAR 1	Animals including humans: Leonardo Da Vinci (Anatomical drawing, 'Vitruvian Man')	Materials: Becky Schroeder - links to free resources requiring a login (Inventor of Glo-sheets which she patented as a 12-year-old)	Plants: Maria Sibylla Merian (German artist, scientific illustrator, and naturalist)	Seasons and weather: Paul Mooney (Weather broadcaster and meteorologist on BBC Look North)	
YEAR 2	Animals including humans: James Alfred Right (Veterinary Surgeon and writer created stories about animals).	Materials: Victoria Callaghan (Develops sustainable packaging for BASF plc)	Plants: Thomas Wyatt Turner (African American civil rights Botanist who studied plant disease)	Living things and their habitats: William Kirby (Father of modern entomology, the study of insects)	
YEAR 3	Animals including humans: Sir Liam Donaldson (former Chief Medical Officer to the government on health matters)	Rocks Florence Bascom (Geologist who studied the origin and formation of mountains)	Plants: Dr Kelsey Byers (Biologist who studies flower smells and how they attract insects)	Light: Percy Shaw (Inventor of the cat's eye)	Forces and magnets: Eric Laithwaite (Electrical Engineer who developed the technology behind the Maglev train)
YEAR 4	Animals including humans: Paul Sharpe (Bioengineer who studies how to regrow teeth if they become damaged)	States of Matter: Daniel Fahrenheit (Physicist who invented the Fahrenheit temperature scale and the thermometer) Anders Celsius (Astronomer who invented the degrees Celsius temperature scale)	Living things and their habitats: Rachel Carson (Aquatic Biologist who wrote about environmental pollution)	Sound: Aristotle (Philosopher who developed the concept that sound travels through air due to the movement of air particles)	Electricity: Joseph Swan (Inventor of the lightbulb and power grid)
YEAR 5	Animals including humans: Virginia Apgar (Doctor & Medical Researcher who developed a method of evaluating the well-being of new-born babies)	Properties and changes of material: Spencer Silver & Arthur Fry (Chemical Engineer & Chemist respectively who invented the post-it note)	Living things and their habitats: David Attenborough - links to free resources requiring a login (Naturalist & TV Presenter)	Earth and Space: Mae Jemison (Astronaut and first Black woman in space)	Forces: George Stephenson (Father of the Railways)
YEAR 6	Animals including humans: Richard Doll (Doctor who proved the link between lung cancer and smoking)	Evolution and inheritance: Charles Darwin -(Natural Historian who developed the theory of evolution by natural selection) Telma Laurentino (Evolutionary Biologist who measures differences in the colour of lizards that live in white desert sands to find differences in their genes which might have allowed them to survive in such an extreme environment)	Living things and their habitats: Beatrix Potter (Mycologist, study of fungi, and Scientific Illustrator)	Light: Ibn al-Haytham (Alhazen) (Physicist & Mathematician who developed a theory that light travels in a straight line, and proved it by carrying out the first scientific experiment)	Electricity: William Armstrong (Built Cragside in Rothbury, the first home powered by hydro-electricity))

Key:

Historically famous scientist

Modern scientists of significance

Scientists from diverse backgrounds

Local/regional scientists of significance

Useful books

EYFS / KS1:

Handa's Surprise

Handa's Surprise would make a great starting point about the needs of living things linked to diet and the specific needs of humans.

Jack and the Beanstalk

The story of Jack and the Beanstalk makes a great starting point for teaching the topic of plants to younger primary aged children.

Little Red Riding Hood

As Little Red Riding Hood is set in a wood, it makes a lovely starting point for finding out about habitats.

Once There were Giants

Support children to understand that all animals, including humans, have offspring which grow into adults.

One Year with Kipper

One Year with Kipper provides a nice link into work on Seasonal Change as children work to observe changes across the four seasons.

RSPB

My First Book of Garden Birds helps to meet the objective to identify and name a variety of common birds.

Tadpole's Promise

Tadpole's Promise is a great story to use when exploring life cycles and helping children to describe the difference in the life cycle of a mammal, an amphibian, an insect and a bird.

The Gruffalo

The Gruffalo can support children to learn more about habitats and to identify and name a variety of plants and animals in different habitats, including micro-habitats.

The Three Little Pigs

Help children to think about identifying different materials and considering what properties they have and how this suits them for different purposes.

LKS2:

Charlie and the Chocolate Factory

Charlie and the Chocolate Factory by Roald Dahl provides a good context to learn about states of matter.

Horrid Henry Rocks

Horrid Henry Rocks is a great book to start teaching about sound and exploring how sounds are made.

The Firework-Maker's Daughter

The Firework-Maker's Daughter by Philip Pullman is a good starting point for teaching about light.

The Iron Man

The Iron Man is the perfect story to explain how magnets attract or repel each other and attract some material and not others.

The Little Mole Who Knew It Was None of His Business

This funny tale creates a great setting through which children can explore simple functions of the basic parts of the digestive system in humans.

The Pebble In My Pocket

The Pebble In My Pocket tells the dynamic story of rock formation; showing the reader the processes that the pebble goes through from its beginnings in a fiery volcano 480 million years ago.

The Story of Frog Belly Rat Bone

The Story of Frog Belly Rat Bone provides a good setting for investigating plants and their benefits to our environment.

The Vanishing Rainforest

The Vanishing Rainforest by Richard Platt is a good book for looking at the human impact on the environment, in particular deforestation.

Wolves

Wolves is a brilliant setting for constructing and interpreting a variety of food chains, as well as identifying producers, predators and prey.

UKS2:

Beetle Boy

Beetle Boy provides a nice way to link to work on classification of invertebrates.

Charlotte's Web

This is the perfect story to compare the lifecycles of different animals and plants.

Pig-Heart Boy

Pig-Heart Boy provides a good setting for learning about the heart and circulation.

George's Secret Key To The Universe

George's Secret Key to the Universe is a fun read and contains lots of factual sections for help with teaching about the solar system.

Goodnight Mister Tom

This wartime story is ideal for exploring the uses of electricity and how circuits work.

Itch

Itch is an action-backed story in which is great for finding out more about changes of state.

Kensuke's Kingdom

Kensuke's Kingdom is full of opportunities to explore properties of materials, you can even use the context of survival scenarios linked to the book.

One Smart Fish

One Smart Fish by Christopher Wormell provides a meaningful context for learning about adaptations and evolution.

The Tin Snail

The Tin Snail by Cameron McAllister provides a context for learning about forces and mechanisms, including levers, pulleys and gears.