Science Curriculum at Our Lady of the Rosary Primary School

Yearly Plan of Events

Year group	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
1	Everyday Materials 1	Movement, forces and magnets 1	Plants 1	Animals and humans 1	Earth and space 1	Science project
2	Uses of Everyday Materials 2	Electricity 1	Plants 2	Animals and humans 2	Living things and their habitats 1	Science project
3	Animals and humans 3	Movement, forces and magnets 2	Plants 3	Materials Rocks 3	Living things and their habitats 2	Light and seeing 1
4	Animals and humans 4	Electricity 2	Sound and hearing 1	Materials states of matter 4	Living things and their habitats 3	Earth and space 2
5	Animals and humans 5	Movement, forces and magnets 3	Sound and hearing 2	Properties and changes of Materials 5	Living things and their habitats 4	Earth and space 3
6	Evolution and inheritance 1	Electricity 3	Light and seeing 2	Animals and humans 6	Living things and their habitats 5	Science project

Biology Chemistry Physics

National Curriculum Programme of Study:

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.

Scientific knowledge and conceptual understanding

The programmes of study describe a sequence of knowledge and concepts. While it is important that pupils make progress, it is also vitally important that they develop secure understanding of each key block of knowledge and concepts in order to progress to the next stage. Insecure, superficial understanding will not allow genuine progression: pupils may struggle at key points of transition (such as between primary and secondary school), build up serious misconceptions, and/or have significant difficulties in understanding higher-order content.

Pupils should be able to describe associated processes and key characteristics in common language, but they should also be familiar with, and use, technical terminology accurately and precisely. They should build up an extended specialist vocabulary. They should also apply their mathematical knowledge to their understanding of science, including collecting, presenting and analysing data. The social and economic implications of science are important but, generally, they are taught most appropriately within the wider Science 145 school curriculum: teachers will wish to use different contexts to maximise their pupils' engagement with and motivation to study science.

The nature, processes and methods of science

'Working scientifically' specifies the understanding of the nature, processes and methods of science for each year group. It should not be taught as a separate strand. The notes and guidance give examples of how 'working scientifically' might be embedded within the content of biology, chemistry and physics, focusing on the key features of scientific enquiry, so that pupils learn to use a variety of approaches to answer relevant scientific questions. These types of scientific enquiry should include: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources. Pupils should seek answers to questions through collecting, analysing and presenting data. 'Working scientifically' will be developed further at key stages 3 and 4, once pupils have built

up sufficient understanding of science to engage meaningfully in more sophisticated discussion of experimental design and control.

Spoken language

The national curriculum for science reflects the importance of spoken language in pupils' development across the whole curriculum – cognitively, socially and linguistically. The quality and variety of language that pupils hear and speak are key factors in developing their scientific vocabulary and articulating scientific concepts clearly and precisely. They must be assisted in making their thinking clear, both to themselves and others, and teachers should ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions.

School curriculum

The programmes of study for science are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, schools therefore have the flexibility to introduce content earlier or later than set out in the programme of study. In addition, schools can introduce key stage content during an earlier key stage if appropriate.

Attainment targets

By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study.

Science - End of Year Expectations - Nursery

Communication and Language

- Understand 'why' questions, for example: "Why do you think the caterpillar got so fat?"

Personal, Social and Emotional Development

- Make healthy choices about food, drink, activity and toothbrushing.

Understanding the World

- Use all their senses in hands-on exploration of natural materials.
- Explore collections of materials with similar and/or different properties.
- Talk about what they see, using a wide vocabulary.
- Begin to make sense of their own life-story and family's history.
- Explore how things work.
- Plant seeds and care for growing plants.
- Understand the key features of the life cycle of a plant and an animal.
- Begin to understand the need to respect and care for the natural environment and all living things.
- Explore and talk about different forces they can feel.
- Talk about the differences between materials and changes they notice.

Science - End of Year Expectations – Reception

Communication and Language

- Learn new vocabulary.
- Ask questions to find out more and to check what has been said to them.
- Articulate their ideas and thoughts in well-formed sentences.
- Describe events in some detail.
- Use talk to help work out problems and organise thinking and activities, and to explain how things work and why they might happen.
- Use new vocabulary in different contexts.

Personal, Social and Emotional Development

- Know and talk about the different factors that support their overall health andwellbeing:
- regular physical activity
- healthy eating
- toothbrushing
- sensible amounts of 'screen time'
- having a good sleep routine
- being a safe pedestrian

Understanding the World

- Explore the natural world around them.
- Describe what they see, hear and feel while they are outside.
- Recognise some environments that are different to the one in which they live.
- Understand the effect of changing seasons on the natural world around them.

Knowledge and skills progression overview

Year 1

Working Scientifically

- ❑ Ask questions such as:
  - Why are flowers different colours?
  - Why do some animals eat meat and others do not?

- ❑ Set up a test to see which materials keeps things warmest, know if the test has been successful and can say what has been learned

- ❑ Explain to someone what has been learned from an investigation they have been involved with and draw conclusions from the answers to the questions asked

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- ❑ Measures (within Year 1 mathematical limits) to help find out more about the investigations undertaken

Year 1				
Biology			**Chemistry**	**Physics**
Animals, including Humans	**Animals, including Humans**	**Plants**	**Everyday Materials**	**Seasonal Change**
• *Name common animals* • *Carnivores, etc*	• *Human body and senses*	• *Common plants* • *Plant structure*	• *Properties of materials* • *Grouping materials*	• *The four seasons* • *Seasonal weather*

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• Know how to classify a range of animals by amphibian, reptile, mammal, fish and birds • Know and classify animals by what they eat (carnivore, herbivore and omnivore) • Know how to sort by living and non living things	• Know the name of parts of the human body that can be seen	• Know and name a variety of common wild and garden plants • Know and name the petals, stem, leaves and root of a plant • Know and name the roots, trunk, branches and leaves of a tree	• Know the name of the materials an object is made from • Know about the properties of everyday materials	• Name the seasons and know about the type of weather in each season

Year 2
Working Scientifically
❑ Ask questions such as: • Why do some trees lose their leaves in Autumn and others do not? • How long are roots of tall trees? • Why do some animals have underground habitats?
❑ Use equipment such as thermometers and rain gauges to help observe changes to local environment as the year progresses
❑ Use microscopes to find out more about small creatures and plants
❑ Know how to set up a fair test and do so when finding out about how seeds grow best
❑ Classify or group things according to a given criteria, e.g. deciduous and coniferous trees
❑ Draw conclusions from fair tests and explain what has been found out
❑ Use measures (within Year 2 mathematical limits) to help find out more about the investigations they are engaged with

Year 2				
Biology			**Chemistry**	
All living things and their habitats	**Animals, including Humans**	**Plants**	**Everyday Materials**	
• *Alive or dead* • *Habitats* • *Adaptations* • *Food chains*	• *Animal reproduction* • *Healthy living* • *Basic needs*	• *Plant and seed growth* • *Plant reproduction* • *Keeping plants healthy*	• *Identify different materials* • *Name everyday materials* • *Properties of materials*	• *Compare the use of different materials* • *Compare movement on different surfaces*
• Classify things by living, dead or never lived • Know how a specific habitat provides for the basic needs of things living there (plants and animals) • Match living things to their habitat • Name some different sources of food for animals • Know about and explain a	• Know the basic stages in a life cycle for animals, (including humans) • Know why exercise, a balanced diet and good hygiene are important for humans	• Know and explain how seeds and bulbs grow into plants • Know what plants need in order to grow and stay healthy (water, light & suitable temperature)	• Know how materials can be changed by squashing, bending, twisting and stretching	• Know why a material might or might not be used for a specific job

simple food chain				

Year 3

Working Scientifically

- ❑ Ask questions such as:
  - Why does the moon appear as different shapes in the night sky?
  - Why do shadows change during the day?
  - Where does a fossil come from?
- ❑ Observe at what time of day a shadow is likely to be at its longest and shortest
- ❑ Observe which type of plants grow in different places e.g. bluebells in woodland, roses in domestic gardens, etc.
- ❑ Use research to find out how reflection can help us see things that are around the corner
- ❑ Use research to find out what the main differences are between sedimentary and igneous rocks
- ❑ Test to see which type of soil is most suitable when growing two similar plants
- ❑ Test to see if their right hand is as efficient as their left hand
- ❑ Set up a fair test with different variables e.g. the best conditions for a plant to grow
- ❑ Explain to a partner why a test is a fair one e.g. lifting weights with right and left hand, etc.
- ❑ Measure carefully (taking account of mathematical knowledge up to Year 3) and add to scientific learning
- ❑ Use a thermometer to measure temperature and know there are two main scales used to measure temperature
- ❑ Gather and record information using a chart, matrix or tally chart, depending on what is most sensible
- ❑ Group information according to common factors e.g. plants that grow in woodlands or plants that grow in gardens
- ❑ Use bar charts and other statistical tables (in line with Year 3 mathematics statistics) to record findings
- ❑ Know how to use a key to help understand information presented on a chart
- ❑ Be confident to stand in front of others and explain what has been found out, for example about how the moon changes shape
- ❑ Present findings using written explanations and include diagrams when needed
- ❑ Make sense of findings and draw conclusions which help them to understand more about scientific information
- ❑ Amend predictions according to findings
- ❑ Be prepared to change ideas as a result of what has been found out during a scientific enquiry

Year 3					
Biology			**Chemistry**	**Physics**	
Animals, including humans	**Plants**	**Plants**	**Rocks**	**Forces**	**Light**
• *Skeleton and muscles* • *Nutrition* • *Exercise and health*	• *Plant life* • *Basic structure and functions*	• *Life cycle* • *Water transportation*	• *Fossil formation* • *Compare and group rocks* • *Soil*	• *Different Forces* • *Magnets*	• *Reflections* • *Shadows*
• Know about the importance of a nutritious, balanced diet • Know how nutrients, water and oxygen are transported within animals and humans • Know about the skeletal and muscular system of a human	• Know the function of different parts of flowing plants and trees	• Know how water is transported within plants • Know the plant life cycle, especially the importance of flowers	• Compare and group rocks based on their appearance and physical properties, giving reasons • Know how soil is made and how fossils are formed • Know about and explain the difference between sedimentary, metamorphic and igneous rock	• Know about and describe how objects move on different surfaces • Know how a simple pulley works and use to on to lift an object • Know how some forces require contact and some do not, giving examples • Know about and explain how magnets attract and repel Predict whether magnets will	• Know that dark is the absence of light • Know that light is needed in order to see and is reflected from a surface • Know and demonstrate how a shadow is formed and explain how a shadow changes shape • Know about the danger of direct sunlight and describe how to

				attract or repel and give a reason	keep protected

Year 4

Working Scientifically

❑ Ask questions such as: • Why are steam and ice the same thing? • Why is the liver important in the digestive systems? • What do we mean by 'pitch' when it comes to sound?	❑ Gather and record information using a chart, matrix or tally chart, depending on what is most sensible
	❑ Group information according to common factors e.g. materials that make good conductors or insulators
❑ Use research to find out how much time it takes to digest most of our food	❑ Use bar charts and other statistical tables (in line with Year 4 mathematics statistics) to record findings
❑ Use research to find out which materials make effective conductors and insulators of electricity	❑ Present findings using written explanations and include diagrams, when needed
❑ Carry out tests to see, for example, which of two instruments make the highest or lowest sounds and to see if a glass of ice weighs the same as a glass of water	❑ Write up findings using a planning, doing and evaluating process
❑ Set up a fair test with more than one variable e.g. using different materials to cut out sound	❑ Make sense of findings and draw conclusions which helps them understand more about the scientific information that has been learned
❑ Explain to others why a test that has been set up is a fair one e.g. discover how fast ice melts in different temperatures	❑ When making predictions there are plausible reasons as to why they have done so
❑ Measure carefully (taking account of mathematical knowledge up to Year 4) and add to scientific learning	❑ Able to amend predictions according to findings
❑ Use a data logger to check on the time it takes ice to melt to water in different temperatures	❑ Prepared to change ideas as a result of what has been found out during a scientific enquiry
❑ Use a thermometer to measure temperature and know there are two main scales used to measure temperature	

Year 4

Biology		Chemistry	Physics	
Animals, including humans	**All living things and their habitats**	**States of Matter**	**Electricity**	**Sound**
• *Digestive system* • *Teeth* • *Food chains*	• *Grouping living things* • *Classification keys* • *Adaptation of living things*	• *Compare and group materials* • *Solids, liquids and gases* • *Changing state* • *Water cycle*	• *Uses of electricity* • *Simple circuits and switches* • *Conductors and insulators*	• *How sounds are made* • *Sound vibrations* • *Pitch and Volume*
• Identify and name the parts of the human digestive system • Know the functions of the organs in the human digestive system • Identify and know the different types of human teeth • Know the functions of different human teeth • Use and construct food chains to identify producers, predators and prey	• Use classification keys to group, identify and name living things • Know how changes to an environment could endanger living things • Group materials based on their state of matter (solid, liquid or gas)	• Know the temperature at which materials change state • Know about and explore how some materials can change state • Know the part played by evaporation and condensation in the water cycle	• Identify and name appliances that require electricity to function • Construct a series circuit • Identify and name the components in a series circuit (including cells, wires, bulbs, switches and buzzers) • Predict and test whether a lamp will light within a circuit • Know the function of a switch • Know the difference between	• Know how sound is made, associating some of them with vibrating • Know how sound travels from a source to our ears • Know the correlation between pitch and the object producing a sound • Know the correlation between the volume of a sound and the strength of the vibrations that produced it • Know what happens to a sound as it travels away from its source

			a conductor and an insulator; giving examples of each	

Year 5	
Working Scientifically	
❑ Set up an investigation when it is appropriate e.g. finding out which materials dissolve or not	❑ Able to present information related to scientific enquiries in a range of ways including using IT such aspower-point and iMovie
❑ Set up a fair test when needed e.g. which surfaces create most friction?	❑ Use diagrams, as and when necessary, to support writing
❑ Set up an enquiry based investigation e.g. find out what adults / children can do now that they couldn'twhen a baby	❑ Is evaluative when explaining findings from scientific enquiry
❑ Know what the variables are in a given enquiry and can isolate each one when investigating e.g. findingout how effective parachutes are when made with different materials	❑ Clear about what has been found out from recent enquiry and can relate this to other enquiries, where appropriate
❑ Use all measurements as set out in Year 5 mathematics (measurement), including capacity and mass	❑ Their explanations set out clearly why something has happened and its possible impact on other things
❑ Use other scientific instruments as needed e.g. thermometer, rain gauge, spring scales (for measuring Newtons)	❑ Able to give an example of something focused onwhen supporting a scientific theory e.g. how mucheasier it is to lift a heavy object using pulleys
❑ Able to record data and present them in a range ofways including diagrams, labels, classification keys, tables, scatter graphs and bar and line graphs	❑ Keep an on-going record of new scientific words thatthey have come across for the first time
❑ Make predictions based on information gleaned from investigations	❑ Able to relate causal relationships when, for example, studying life cycles
❑ Create new investigations which take account of what has been learned previously	❑ Frequently carry out research when investigating a scientific principle or theory

Year 5

Biology		Chemistry	Physics	
All living things and their habitats	**Animals, including humans**	**Properties and changes in materials**	**Forces**	**Earth and Space**
• *Life cycles – plants and animals* • *Reproductive processes* • *Famous naturalists*	• *Changes as humans develop from birth to old age*	• *Compare properties of everyday materials* • *Soluble/ dissolving* • *Reversible and irreversible substances*	• *Gravity* • *Friction* • *Forces and motion of mechanical devices*	• *Movement of the Earth and the planets* • *Movement of the Moon* • *Night and day*
• Know the life cycle of different living things e.g. mammal, amphibian, insect and bird • Know the differences between different life cycles • Know the process of reproduction in plants • Know the process of reproduction in animals	• Create a timeline to indicate stages of growth in humans	• Compare and group materials based on their properties (e.g. hardness, solubility, transparency, conductivity, [electrical & thermal], and response to magnets • Know and explain how a material dissolves to form a solution • Know and show how to recover a substance from a solution • Know and demonstrate how some materials can be separated (e.g. through filtering, sieving and evaporating) • Know and demonstrate that some changes are reversible and some are not • Know how some changes	• Know what gravity is and its impact on our lives • Identify and know the effect of air and water resistance • Identify and know the effect of friction • Explain how levers, pulleys and gears allow a smaller force to have a greater effect	• Know about and explain the movement of the Earth and other planets relative to the Sun • Know about and explain the movement of the Moon relative to the Earth • Know and demonstrate how night and day are created • Describe the Sun, Earth and Moon (using the term spherical)

		result in the formation of a new material and that this is usually irreversible		

Year 6

Working Scientifically

❑ Know which type of investigation is needed to suitparticular scientific enquiry e.g. looking at the relationship between pulse and exercise	❑ Use a range of written methods to report findings,including focusing on the planning, doing and evaluating phases
❑ Set up a fair test when needed e.g. does light travel instraight lines?	❑ Clear about what has been found out from theirenquiry and can relate this to others in class
❑ Know how to set up an enquiry based investigation e.g. what is the relationship between oxygen andblood?	❑ Explanations set out clearly why something has happened and its possible impact on other things
❑ Know what the variables are in a given enquiry andcan isolate each one when investigating	❑ Aware of the need to support conclusions withevidence
❑ Justify which variable has been isolated in scientific investigation	❑ Keep an on-going record of new scientific words that they have come across for the first time and use theseregularly in future scientific write ups
❑ Use all measurements as set out in Year 6 mathematics (measurement), including capacity, mass, ratio and proportion	❑ Use diagrams, as and when necessary, to support writing and be confident enough to present findingsorally in front of the class
❑ Able to record data and present them in a range of ways including diagrams, labels, classification keys, tables, scatter graphs and bar and line graphs	❑ Able to give an example of something they have focused on when supporting a scientific theory e.g.classifying vertebrate and invertebrate creatures orwhy certain creatures choose their unique habitats
❑ Make accurate predictions based on information gleaned from their investigations and create newinvestigations as a result	❑ Frequently carry out research when investigating ascientific principle or theory
❑ Able to present information related to scientific enquiries in a range of ways including using IT such aspower-point, animoto and iMovie	

Year 6

Biology

Animals, including humans

- *The circulatory system*
- *Water transportation*
- *Impact of exercise on body*

- Identify and name the main parts of the human circulatory system
- Know the function of the heart, blood vessels and blood
- Know the impact of diet, exercise, drugs and lifestyle on health
- Know the ways in which nutrients and water are transported in animals, including humans

All living things and their habitats

- *Classification of living things and the reasons for it*

- Classify living things into broad groups according to observable characteristics and based on similarities and differences
- Know how living things have been classified
- Give reasons for classifying plants and animals in a specific way

Evolution and Inheritance

- *Identical and non identical off-spring*
- *Fossil evidence and evolution*
- *Adaptation and evolution*

- Know how the Earth and living things have changed over time
- Know how fossils can be used to find out about the past
- Know about reproduction and offspring (recognising that offspring normally vary and are not identical to their parents)
- Know how animals and plants are adapted to suit their environment
- Link adaptation over time to evolution
- Know about

Physics

Electricity

- *Electrical components*
- *Simple circuits*
- *Fuses and voltage*

- Compare and give reasons for why components work and do not work in a circuit
- Draw circuit diagrams using correct symbols
- Know how the number and voltage of cells in a circuit links to the brightness of a lamp or the volume of a buzzer

Light

- *How light travels*
- *Reflection*
- *Ray models of light*

- Know how light travels
- Know and demonstrate how we see objects
- Know why shadows have the same shape as the object that casts them
- Know how simple optical instruments work e.g. periscope, telescope, binoculars, mirror, magnifying glass etc.

		evolution and can explain what it is		