JLPS Curriculum Overview for Science
2021-22

Rationale

At Joy Lane Primary School, the teaching of Science promotes an understanding of the natural, physical and technological world in which we live. It enables us to foster our children's curiosity to know more about the world and understand the scientific method for investigating, checking and enquiring further. Pupils will be encouraged to work both independently and as team players to investigate and explore as practically as possible throughout each science unit. Whilst our science curriculum covers all aspects of the National Curriculum, it has been structured in a way that specific science units are taught to match other curriculum subject units in each year group to allow for meaningful cross-curricular links to be optimised and to enable children to learn in context.

As children progress through the school, they will be encouraged to develop enquiring minds and a scientific approach to problem solving. Pupils will be taught elements of Biology, Chemistry and Physics during each academic year. They will learn a range of investigative skills such as setting up practical enquiries, making observations and obtaining evidence through measurement, gathering data, presenting their findings in different ways and drawing reasonable conclusions from their findings whilst questioning their outcomes. In Years 5 and 6, pupils will identify scientific evidence that has been used to support or refute ideas/arguments. With our younger children, more scientific activities will arise from an exploration of the world around them and everyday items. All children are encouraged to explore, to observe and to order their observations in a logical way, having the opportunity to perform tests and gather and record data. Throughout, children will be taught to use equipment safely and accurately, including the use of ICT to measure and record data.

Pupils will be encouraged to relate their skills and understanding to many areas of everyday life, including safety considerations, following instructions, personal health, environmental concerns and domestic applications. At various stages of science teaching, children will be introduced to the life cycles of the main plant and animal groups, which will include reproduction, seed dispersal and the rearing of young animals.

Reception

Understanding the World

Birth to three:	3 and 4 year olds:	Children in Reception:
Explore materials with different properties. Explore natural materials, indoors and outside. Explore and respond to different natural phenomena in their setting and on trips. Explore different materials, using all their senses to investigate them. Manipulate and play with different materials.	Make healthy choices about food, drink, activity and toothbrushing. 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. Explore how things work. Talk about the differences between materials and changes they notice. Explore different materials freely, to develop their ideas about how to use them and what to make. 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.	Know and talk about the different factors that support their overall health and wellbeing: • regular physical activity • healthy eating • toothbrushing Explore the natural world around them. Describe what they see, hear and feel whilst outside. Understand the effect of changing seasons on the natural world around them.

Please refer to Development Matters (page 101 onwards) to see example of how to support the above.

Early Learning Goals:

- **Managing Self** – PSED - • Manage their own basic hygiene and personal needs, including dressing, going to the toilet and understanding the importance of healthy food choices.
- **The Natural World** - • Explore the natural world around them, making observations and drawing pictures of animals and plants. • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

Year 1

Questioning	Planning	Observation	Recording	Reporting	Evaluating
I ask questions based on exploration of the world around me.	I respond to prompts by making some suggestions about how to find an answer.	I perform simple tests. I use senses and simple equipment to make observations. I talk about what happens and record using words and pictures.	I begin to record data in simple templates.	I identify what has changed when observing objects, living things or events. I use simple data to answer questions. I suggest what I have found out.	I talk in simple terms about what might happen based own experiences and observations.

Year Group Unit Headings

Terms 1 / 2	Terms 3 / 4	Terms 5 / 6
Seasons (p115 NC) Observe changes across the four seasons Observe and describe weather associated with the seasons and how day length varies.	**Materials** (p115 NC) 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** (p113 NC) 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** (p114 NC / p117) 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. 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 amount of different types of food, and hygiene.	
Vocabulary					
Seasons **Autumn** **Spring** **Winter**	**Month** **Weather** **Event** **Summer**	**Wood** **Plastic** **Glass** **Water** **Metal**	**Hard** **Soft** **Object** **Material** **Shiny**	**Dull** **Rough** **Rock**	**Wild** **Garden** **Weed** **Roots** **Leaves** **Evergreen** **Flowering** **Tree** **Plant** **Fruit**	**Fish** **Human** **Amphibian** **Exercise** **Reptile** **Food** **Bird** **Hygiene** **Mammal** **Offspring** **Carnivore** **Water** **Herbivore** **Food** **Omnivore** **Air**
Year 2					
Questioning	**Planning**	**Observation**	**Recording**	**Reporting**	**Evaluating**
I ask simple questions and recognise that they can be answered in different ways. I talk about similarities and differences.	I use simple equipment to make observations.	I carry out instructions for a simple investigation. I talk about and record what is seen and observed. I take accurate measurements using simple equipment and classify data and information.	I record data using simple charts, tables and block graphs.	I record and communicate findings in a range of ways using simple scientific language. I talk about what has been found out and how it was discovered.	I talk in simple scientific terms about what might happen and why. (Prediction) I use my observations and gathered data to answer questions.
Year Group Unit Headings					
Terms 1 / 2		**Terms 3 / 4**		**Terms 5 / 6**	
Materials (p118 NC) Identify and compare the suitability of a variety of everyday materials, including wood, 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.		**Living things and their habitats** (p116 NC) 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.		**Plants** (p117 NC) 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** (p114 NC / p117) Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (FROM YEAR 1 – RECOVERY PLAN)	
Vocabulary					
Squish **Brick** **Bend** **Cardboard** **Twist** **Shape** **Stretch** **Solid** **Materials**		**Life processes** **Living** **Dead** **Food chain** **Food sources** **Habitat** **Microhabitat** **Depend** **Survive**		**Water** **Sprout** **Shoot** **Seed Dispersal** **Sunlight** **Temperature** **Nutrition** **Soil**	
Year 3					
Questioning	**Planning**	**Observation**	**Recording**	**Reporting**	**Evaluating**
I ask relevant questions. I use different types of scientific enquiries to answer questions.	I set up simple practical enquiries. I recognise and identify some factors needed to make a test 'fair' and explain why it is fair.	I use observations and knowledge to answer scientific questions. I describe what happens when taking part in simple investigations/fair tests.	I record data using a range of charts, tables and block graphs and labelled diagrams.	I talk about data collected from observations and measurements, using drawings, labelled diagrams, notes, simple tables and keys.	I begin to identify new questions arising from data and make new predictions for new values within or beyond the data collected.

	I set up a test to compare two things.	I begin to make decisions about what to observe and how long to observe for. I read simple scales and take accurate measurements using standard units. I talk about criteria for grouping, sorting and classifying and use simple keys.		I begin to draw and express some conclusions by looking at changes, patterns, similarities and differences in data.	I report on findings from enquires including oral and written explanations.

Year Group Unit Headings		
Terms 1 / 2	**Terms 3 / 4**	**Terms 5 / 6**
Animals incl humans (p121 NC) 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. **Light** (p122 NC) 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 form a light source is blocked by a solid object. Find patterns in the way that the size of shadows change.	**Forces and Magnets** (p 123 NC) 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 and 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.	**Plants** (p121 NC) Identify and describe the function 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. **Rocks (**p123 NC) Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.

Vocabulary				
Diet **Skeletons** **Saturated** **Muscles** **Unsaturated** **Disease** **Tendons** **Nutrition** **Joints** **Healthy** **Vertebrate** **Energy** **Invertebrate**	**Light** **Light source** **Dark** **Reflection** **Ray** **Reflective / Reflect** **Pupil** **Retina** **Shadow** **Opaque** **Translucent** **Transparent**	**Forces** **Friction** **Surface** **Magnet** **Magnetic / Magnetic field** **Poles** **Repel** **Attract**	**Germination** **Stem** **Evaporation** **Fertilisation** **Petals** **Stamen** **Carpel** **Sepal** **Pollen** **Pollination**	**Igneous rock** **Sedimentary rock** **Metamorphic rock** **Magma** **Lava** **Sediment** **Permeable** **Impermeable** **Erosion**

Year 4

Questioning	Planning	Observation	Recording	Reporting	Evaluating
I raise my own relevant questions and use different types of scientific enquiry to answer questions.	I set up simple practical enquiries, comparative and fair tests. I identify the factors in a simple 'fair' test that we will measure (variables) and keep the same (control).	I make decisions about what to observe, how long to observe for, and the type of equipment needed. I make accurate observations and measurements. I use a range of measuring equipment appropriately, including thermometers, data loggers, etc. I identify differences, similarities and changes related to enquiry. I use observations and knowledge to answer scientific questions.	I gather, record, classify and present data in a variety of ways to help answer questions. I use simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.	I use straightforward scientific evidence to answer questions or to support their findings. I collect data from observations and measurements, using notes, simple tables and standard units, using drawings, labelled diagrams, keys, bar charts and tables. I identify changes, patterns, similarities and differences in data in order to draw conclusions.	I suggest improvements and identify new questions arising from data and make new predictions for new values within or beyond the data collected. I report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.

Year Group Unit Headings		
Terms 1 / 2	**Terms 3 / 4**	**Terms 5 / 6**
Forces (p132 NC – Year 5 obj) 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.	**Animals incl humans** (p124 NC) 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	**Electricity** (p126 NC) Identify common appliances that run on electricity. Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, switches and buzzers.

Recognise that some mechanisms, including levers, pulleys and gears allow a smaller force to have a greater effect	**Living Things and their Habitats** (p124 NC) Recognise that living things can be grouped in a variety of ways. Explore and use classification keys. Recognise that environments can change and that this can sometimes pose dangers to living things.	Identify whether or not a lamp will light in a 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 of circuits. Recognise some common conductors and insulators and associate metals with being good conductors. **Materials** (p130 NC – year 5 obj) Compare and group together everyday materials on the basis of their properties, including their hardness and conductivity (electrical and thermal).

Vocabulary

Gravity **(Earth's) Gravitational pull** **Weight** **Mass** **Air resistance** **Water resistance** **Buoyancy** **Streamlined** **Mechanism** **Upthrust**	**Digest** **Stomach** **Oesophagus** **Small Intestine** **Large Intestine** **Rectum** **Producer** **Predator** **Prey** **Omnivore**	**Environment** **Organism** **Respiration** **Reproduction** **Excretion** **Nutrition** **Endangered species** **Extinct** **Vertebrates** **Invertebrates** **Specimen**	**Circuit** **Cell** **Wire** **Switch** **Buzzer** **Battery** **Conductor** **Insulator**	**Properties** **Thermal** **Electrical** **Irreversible** **Reversible** **Soluble** **Insoluble**

Year 5

Questioning	Planning	Observation	Recording	Reporting	Evaluating
I explore ideas and raise a range of relevant questions. I select and plan the most appropriate type of scientific enquiry for answering a scientific question.	I decide which variables to measure, change and keep the same. I demonstrate how to change one factor (variable) whilst keeping others the same (control). I identify and use an appropriate unit to measure variables effectively.	I recognise when and how to set up comparative and fair tests and begin to explain which variables need to be controlled and why. I make decisions about what to observe, what measurements to use and how long to measure them for. I choose appropriate equipment to make measurements, using standard units of measure and simple scales accurately.	I gather, record, classify and present a range of data in different ways. I record data and results using scientific diagrams and labels, classification keys, tables, and bar and line graphs.	I explain casual relationships in enquiry. I use relevant scientific language to communicate findings and justify scientific ideas. I make general statements such as: 'The hotter the water, the faster the sugar dissolves'.	I make practical suggestions about how working methods could be improved. I use results to identify when further tests and observations might be needed. I look for different relationships in data and begin to identify evidence that refutes or supports ideas.

Year Group Unit Headings

Terms 1 / 2	Terms 3 / 4	Terms 5 / 6
Animals incl Humans (p133 NC – Yr 6 obj: Animals incl humans / p129 NC All living things) 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. Describe the changes as humans develop to old age. **States of Matter** (p125 NC – Year 4 obj/ **Properties and changes of materials** p130 NC) 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 happened in degrees Celsius (°C). Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. Compare and group materials together on the basis of their properties. 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.	**Sound** (p125 NC – Year 4 obj) Identify how sounds are made, associating some of them with something vibrating. Recognise that vibrations from sound 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.	**Light** (p135 NC – Year 6 obj) 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 object that cast them.

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 formulation 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. **Materials** (p130 NC – Year 5 obj) Compare and group together everyday materials on the basis of their properties, including their hardness and conductivity (electrical and thermal). (FROM YEAR 4 RECOVERY PLAN)		

Vocabulary

Circulatory System **Heart** **Blood Vessels** **Oxygenated Blood** **Deoxygenated Blood** **Drug** **Alcohol** **Nutrients**	**Solids** **Liquids** **Gases** **Water vapour** **Melt** **Freeze** **Evaporate** **Condense** **Precipitation**	**Vibration** **Sound wave** **Volume** **Amplitude** **Pitch** **Ear Particles** **Distance Soundproof** **Absorb Vacuum** **Eardrum**	**Reflection** **Incident ray** **Reflected ray** **Refraction** **Visible spectrum** **Prism** **Shadow** **Transparent / Translucent**

Year 6

Questioning	Planning	Observation	Recording	Reporting	Evaluating
I explore ideas and raise a range of relevant questions. I use simple models or diagrams to explain scientific thinking.	I identify and use an appropriate unit to measure variables effectively. I select the most suitable variables to be investigated. I identify some variables that cannot be controlled or explain. I recognise some situations in which a fair test cannot be carried out.	I recognise when and how to set up comparative and fair tests and clearly explain which variables need to be controlled and why. I make independent decisions about what to observe, what measurements to use and how long to measure them for, taking repeat readings when appropriate. I choose the most appropriate equipment (with a variety of intervals and units) to make measurements and explain how to use accurately.	I gather, record, classify and present data in a wide range of ways. I use a wide range of methods to record data including line graphs, scientific diagrams, classification keys, scatter, bar and line graphs etc.	I use relevant scientific language and illustrations to communicate findings and scientific ideas. I look for a range of different relationships in data and begin to identify evidence that refutes or supports ideas. I make increasingly measured general statements such as: 'As the temperature increases the mass of the sugar which can be dissolved increases. I report and present findings from enquiries in oral and written forms such as displays and other presentations.	I identify when test results may not be trustworthy and need to be repeated in order to attain reliable results. I use test results to make predictions and set up further comparative and fair tests.

Year Group Unit Headings

Terms 1 / 2	Terms 3 / 4	Terms 5 / 6
Rocks (p123 NC - Year 3 obj) Describe in simple terms how fossils are formed when thigs that have lived are trapped within rock. Recognise that soils are made from rocks and organic matter. **Evolution and inheritance** (p134 NC) 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 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. **Earth and space** (p131 NC – Year 5 obj) 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.	**Electricity** (p135 NC) 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. **States of Matter** (p125 NC – Year 4 obj) **Properties and Changes of Materials** (p130 NC – Year 5 obj) Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. 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.	**All living things** (p129 NC – Year 5 obj/ Animals incl humans p129 year 5 obj / p133 – Year 6 obj) 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. 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. **Plants** (p121 NC - Year 3 obj) Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

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.			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 formulation 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. (FROM YEAR 5 RECOVERY PLAN)		
Vocabulary					
Fossilisation **Palaeontology** **Erosion** **Igneous** **Metamorphic** **Sedimentary** **Permeable** **Impermeable**	**Offspring** **Inheritance** **Variations** **Adaptation** **Habitat** **Environment** **Fossil** **Natural Selection** **Adaptive traits** **Inherited traits**	**Sun** **Star** **Moon** **Planet** **Sphere** **Spherical bodies** **Orbit** **Rotate** **Axis** **Geocentric model** **Heliocentric model**	**Circuit** **Symbol** **Cell / Battery** **Current** **Amps** **Resistance** **Voltage** **Electrons** **Current**	**Asexual reproduction** **Metamorphosis** **Reproduction** **Sexual reproduction** **Fertilisation**	**Seed formation** **See Dispersal** **Pollination** **Evaporation** **Deciduous** **Reproduction** **Fertiliser**