JLPS Curriculum Overview for Science

Rationale

At Joy Lane, we strive to provide high-quality Science teaching that promotes curiosity, exploration and scientific knowledge and skills development. The teaching of Science promotes an understanding of the natural, physical and technological world in which we live. Our approach aims to develop practical skills, critical thinking, and problem-solving abilities as well as ensuring a clear progression in knowledge, skills, and understanding across the school that is in line with the National Curriculum.

Teachers provide opportunities for scientific investigations and experiments, which promote interactive, hands-on learning experiences. A shift away from repetitive experiment write ups has moved towards a renewed focus on promoting pupils' scientific literacy, vocabulary acquisition, and their ability to communicate their understanding effectively through discussion.

We are passionate about all children achieving this and employ a range of strategies (such as Knowledge Organisers, Widgit visuals, scaffolds, modelled examples and pre-teaching) to support our SEND, disadvantaged and lowest 20% of pupils.

Science is taught through a wide range and combination of practical experiments, demonstrations, discussions, and outdoor activities to engage students in the subject. Our 'Voices for Choices' approach develops our children's metacognitive skills, supporting them in voicing the learning process and building resilience in the face of new problems. This, alongside a renewed focus on practical, hands-on approaches, is working to enhance pupils' engagement and love for the subject to flourish.

Regular formative assessment and feedback will be used to monitor progress and provide necessary support or challenge. Opportunities to revisit learning from the previous lesson, unit, year, etc. are highly valued and planned in to support retrieval practice and making links to new learning.

Early Years Foundation Stage

Understanding the World

Birth to three:	3 and 4 year olds:
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.

Please refer to Development Matters to see example of how to support the above.

Reception

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.

Questioning	Planning	Observation	Recording	Reporting	Evaluating
I ask questions based on exploration of the world around me.	I can talk about how I am going to work.	I perform simple tests in my play. I use senses and simple equipment to make observations. I talk about what happens.	I may begin to record ideas and findings in my own way (speaking, drawing, cut and stick, labelling)	I can talk about what has changed when observing objects. living things or events. I explain what I have found out.	I talk in simple terms about what happened.

Terms 1 / 2	Terms 3 / 4	Terms 5 / 6
Seasons Understand the effect of changing seasons on the natural world around them. **Senses** Explore the natural world outside. Describe what they see, hear, smell and feel whilst outside.	**Seasons** Know what season we are in and compare to last terms observations. Children will know some animals that hibernate and explain why they hibernate. **Animals and their habitats** Explore and know why some animals are best suited to living in cold environments. Children will know and order the lifecycle of a chick. **Exploring and investigating changing states of matter** Children will explore ice and know different methods to break/melt the ice and how ice is formed.	**Plants** Know and understand what a plant/seed needs to grow. Children will care for a plant/seed. Identify what season we are in- could we grow plants/seeds in another season? Predict what happens when seeds are grown in different variables. Know and explore where different vegetables grow. **Animals and their habitats** Name some mini-beasts and describe their key characteristics. Know and order the life-cycle of a butterfly. Children will identify and name some animals that live under water and begin to explore why they can survive in water. **Materials**

				Children will know what is meant by floating and sinking and explore/test a range of materials.	
Vocabulary					
Natural world, Seasons: winter, autumn, spring, summer Senses, touch, smell, taste, see, hear, changes,		Seasons: winter, autumn, spring, summer Life cycle, egg, chick, chicken ice, melt, frozen, changing state of matter, investigate, hibernation, nocturnal		Plant, seed, life-cycle, Floating, sinking, Materials, wood, plastic, glass, metal	
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**	
Seasonal Changes Observe changes across the four seasons Observe and describe weather associated with the seasons and how day length varies.		**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. **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.		**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.	
Vocabulary					
Seasons **Weather** **Spring** **Winter** **Autumn** **Summer** **Daylight**		**Wood** **Plastic** **Glass** **Water** **Metal** **Rock** **Shiny** **Hard** **Soft** **Material** **Dull** **Rough** **Opaque** **Transparent** **Waterproof** **Absorbent**	**Fish** **Amphibian** **Reptile** **Bird** **Mammal** **Human** **Diet** **Carnivore** **Herbivore** **Omnivore** **Touch** **Taste** **Smell** **Sight** **Hear**	**Wild** **Garden** **Weed** **Tree** **Plant** **Seed** **Roots** **Leaves** **Flowering** **Petal** **Stem** **Fruit** **Bulb** **Evergreen** **Deciduous**	
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**	
Use of Everyday Materials		**Living things and their habitats**		**Plants**	

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.	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.	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.

Vocabulary			
Properties of materials **Flexible** **Recycle** **Pollution** **Shape (squash, stretch, twist, bend)**	**Living** **Dead** **Never living** **Life processes** **Food chain** **Food sources** **Microhabitat** **Habitats** **Depend** **Survive**	**Water** **Sprout** **Shoot** **Seed Dispersal** **Sunlight** **Nutrition** **Germination** **Temperature**	**Adult** **Develop** **Life Cycle** **Offspring** **Young** **Live young** **Diet** **Exercise** **Hygiene** **Nutrition** **Germs**

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 set up a test to compare two things.	I use observations and knowledge to answer scientific questions. I describe what happens when taking part in simple investigations/fair tests. 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 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 draw and express some conclusions by looking at changes, patterns, similarities and differences in data.	I begin to identify new questions arising from data and make new predictions for new values within or beyond the data collected. 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 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** 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** 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** 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. Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. **Rocks, Fossils and soils** 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.

Vocabulary				
Skeleton **Muscles** **Tendons**	**Light** **Light source** **Dark**	**Forces** **Friction** **Surface**	**Germination** **Evaporation** **Fertilisation**	**Igneous rock** **Sedimentary rock**

Joints **Saturated fats** **Unsaturated fats** **Nutrition** **Energy** **Nutrients** **Vertebrate** **Invertebrate**	**Reflection** **Ray** **Reflective / Reflect** **Shadow** **Opaque** **Translucent** **Transparent**	**Magnetic / Magnetic field** **Poles** **Repel** **Attract**	**Stamen** **Carpel** **Sepal** **Pollen** **Pollination** **Nutrients** **Seed disperal**	**Metamorphic rock** **Magma** **Lava** **Sediment** **Permeable** **Impermeable** **Erosion** **Fossilisation** **Palaeontology**

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
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 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.	**Electricity** 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. 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. **Living things and their habitats:** Recognise that livings 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 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. **Animals incl 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.

Vocabulary

Solids **Liquids** **Gases** **Water vapour** **Melt** **Freeze** **Evaporate** **Condense** **Precipitation**	**Mains electricity** **Appliances** **Conductor** **Insulator** **Circuit** **Battery** **Cell** **Wire** **Switch** **Buzzer** **Motor**	**Organism** **Specimen** **Environment** **Endangered species** **Extinct** **Classification** **Characteristics** **Vertebrates** **Invertebrates**	**Vibration** **Sound wave** **Volume** **Amplitude** **Pitch** **Ear** **Particles** **Distance** **Soundproof** **Absorb** **Eardrum**	**Digest** **Stomach** **Oesophagus** **Small Intestine** **Large Intestine** **Rectum** **Producer** **Predator** **Prey** **Molar** **Premolar** **Incisor** **Canine**

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
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. **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.	**Animals, including humans** Describe 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.

Vocabulary

Gravity (Earth's) **Gravitational pull** **Weight** **Mass** **Air resistance** **Water resistance** **Buoyancy** **Streamlined** **Mechanism** **Up thrust**	**Embryo** **Egg** **Metamorphosis** **Sexual** **Asexual** **Reproduction** **Fertilisation** **Pollination** **Pregnancy** **Gestation**	**Sun** **Star** **Moon** **Planet** **Sphere** **Spherical bodies** **Orbit** **Rotate** **Axis** **Satellite** **Geocentric model** **Heliocentric model** **Astronomer**	**Puberty** **Life cycle** **Gestation** **life expectancy** **pre-natal** **menstruation** **adulthood** **Foetus** **teenager** **childhood** **adolescence**	**Dissolve** **Solution** **Separating** **Mixing** **Burning** **Filtering** **Sieving** **Reversible** **Irreversible** **Conductor** **Insulator** **Transparency**

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 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	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.

		I choose the most appropriate equipment (with a variety of intervals and units) to make measurements and explain how to use accurately.		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.	

Year Group Unit Headings		
Terms 1 / 2	**Terms 3 / 4**	**Terms 5 / 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 micro-organisms, plants and animals. Give reasons for classifying plants and animals based on specific characteristics. **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 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.	**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.	**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. **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.

Vocabulary				
Microorganisms **Bacteria** **Microscope** **Microbes** **Fungi** **Decompose** **Mould**	**Fossil** **Natural Selection** **Adaptive traits** **Inherited traits** **Offspring** **Inheritance** **Adaptation** **Variations** **Habitat** **Environment**	**Circuit** **Symbol** **Cell / Battery** **Amps** **Resistance** **Voltage** **Electrons** **Current**	**Circulatory System** **Heart** **Blood Vessels** **Oxygenated Blood** **Deoxygenated Blood** **Drug** **Alcohol** **Nutrients**	**Reflection** **Incident ray** **Reflected ray** **Refraction** **Visible spectrum** **Prism** **Transparent** **Translucent** **Opaque**