Science

Progression of Knowledge & Skills

Curriculum Intent

At John Ruskin Primary School, we strive to a deliver an exciting and engaging science curriculum that is both memorable and encourages students to be inquisitive about the world around them. We believe that understating the world through scientific displaces, is vital in building a generation capable of navigating their way through future issues that may arise. Pupils are taught the essential knowledge, methods and processes necessary to enable them to make links within and across scientific topics and other curriculum areas. We begin exposing children to scientific concepts during their early years of education, through experiential learning. We believe this moulds an attitude of curiosity that allows children to draw their own conclusions during investigations, which they can apply across their learning journey. Throughout these experiences, students are immersed in the appropriate scientific vocabulary, which allows them to embed the knowledge they have acquired during investigative experiences. In the national curriculum, science involves both conceptual and procedural understanding, we allow students the opportunity to achieve this through developing their practical skills, making predictions and working scientifically. We intend to provide this for all our students, irrespective of ethnic origin, gender, class, or ability.

	Animals including humans	Vocabulary
EYFS	• Develop positive attitudes about the differences between people. Nur Au2 UW, Nur Sp1 UW • Match animals to their babies/talk about a simple lifecycle of an animal. Nur Sp1 UW • Notice changes in animals. Nur Sp1 UW • Make simple reflections on how they have changed since starting in Nursery. Nur Su2 UW • Begin to understand key features of the life cycle of people and animals. Nur Su2 UW • Begin to understand the importance of healthy eating, being active and cleaning teeth. Nur Su1,2 PD • Name human body parts - Rec Au1 PD, Rec Au1 EAD, Rec Sp1 Lit • Identify animals that live on land, in the air, in water and in different parts of the world – Rec Sm1 – Cross Curricular	
Year 1	• Identify and name a variety of common animals that are birds, fish, amphibians, reptiles 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 (birds, fish, amphibians, reptiles and mammals, and including pets).	

	• Identify, name draw and label the basic parts of the human body and say which parts of the body is associated with each sense.	
Year 2	• 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.	
Year 3	• 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 animals have skeletons and muscles for support, protection and movement.	
Year 4	• 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.	
Year 5	• Describe the changes as humans develop from birth to old age.	Gestation Foetus Fertilisation Species Baby Toddler Adolescent Adult Elderly person Puberty Hormones Pituitary gland Testosterone Oestrogen
Year 6	• Identify and name the main parts of the human circulatory system, and explain 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.	Circulatory system – heart, blood, veins, arteries, pulse, clotting Diet – balanced, vitamins, minerals, proteins, carbohydrates, sugars, fats

		Drugs – caffeine, nicotine, alcohol, cannabis, cocaine, heroine Lifestyle – healthy

	Everyday Materials	Vocabulary
EYFS	• To explore collections of materials with similar and/or different properties. Nur Au2 UW, Su1 UW • Talk about differences they notice between materials. Nur Su1 UW	
Year 1	• Distinguish between an object and the material from which it is made. • Identify and name a variety of everyday materials, including wood, plastic, glass, 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 physical properties.	
Year 2	• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	
Year 5	• 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 • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic	**Thermal conductivity** – thermal conductor, thermal insulator **Electrical conductivity** – electrical conductor, electrical insulator

	Plants	Vocabulary

EYFS	• Plant seeds and care for growing plants. Nur Sp2 UW • Begin to understand key features of the life cycle of a plant. Nur Su2 UW • Explore the natural world around them Rec Sm2 UW • Explore the life cycle of a plant Rec Sm2 UW	
Year 1	• Identify and name a variety of common plants, including garden plants, wild plants and trees, and those classified as deciduous and evergreen • Identify and describe the basic structure of a variety of common plants including roots, stem/trunk, leaves and flowers.	
Year 2	• 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.	
Year 3	• Identify and describe the functions of different parts of plants; roots, stem, 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 ways in which water is transported within plants. • Explore the role of flowers in the life cycle of flowering plants, including pollination, seed formation and seed dispersal	

	Seasonal Change	**Vocabulary**
EYFS	• Understand the effect of the change of seasons on the world around them Rec Au2 UW, Rec Sm2 UW • Identify features of the weather on a given day or across the week Rec Sm2 UW	
Year 1	• Observe changes across the four seasons • Observe and describe weather associated with the seasons and how day length varies.	

	Living things and their habitats	**Vocabulary**
EYFS	• Respect and care for the natural environment and all living things. Nur Au1 UW, Sp2 UW • Living in the Cold Rec Sm1 Cross Curricular • Desert Worlds Rec Sm1 Cross Curricular • Conserving Oceans Rec Sm2 Cross Curricular	EYFS

Year 2	• 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	• 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	
Year 4	• 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 •	
Year 5	• Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird • Describe the life process of reproduction in some plants and animals.	Animals – amphibians, reptiles, birds, mammals, insects, fish Animal development – egg, larva, pupa, nymph, adult, metamorphosis Parts of a flower – petal, stamen (anther + filament), carpel (stigma + style + ovary + ovule) Processes – pollination, fertilisation, germination
Year 6	• 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	Classification Vertebrate, invertebrate

	• 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.	Kingdoms: animal, plant, 'micro-organism' Classes: amphibian, reptile, bird, mammal, Scales, feathers Flowering plant, non-flowering plant

	Forces and Magnets	Vocabulary
EYFS	• Explore wheeled toys and ramps. Nur Sp1 UW • Explore floating and sinking with a range if toys. Nur Su1 UW	
Year 3	• 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 5	• 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.	Types of forces: gravity, friction, air resistance, upthrust, weight Measuring forces: Newton meter, Newtons (N) Surface area Push, pull Balance

		Mass – grams and kilograms Mechanical devices – gears, levers, pulleys, springs

	Light	Vocabulary
Year 3	• 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 a solid object • Find patterns in the way that the sizes of shadows change.	
Year 6	• 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	**Simple comparisons**: dark, dull, bright, very bright **Comparative vocabulary**: brighter, duller, and darker **Superlative vocabulary**: brightest, dullest, and darkest Opaque, translucent, transparent **Shadow** – block, absence of light Reflect – bounce, mirror, reflection See – light source Sun – sunset, sunrise, position

	Rocks	Vocabulary
Year 3	• 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.	**Names of rocks** – Chalk, limestone, granite, basalt, sandstone, flint, slate, shale, marble **Types of rock –** Sedimentary, metamorphic, igneous **Types of minerals** – Calcite, feldspar, topaz, diamond, talc, corundum **Properties of rocks** – Hard/soft, permeable/impermeable **Processes** – Heat, pressure, erosion, transportation, deposition, melt, solidify **Size of rocks** – Grain, pebbles **Rock describing words** – Crystals, layers **Early areas of land** – Gondwana, Pangea **Land formations** – Plates, volcanoes, mountains, valleys

	Electricity	Vocabulary

EYFS	• To explore how things work. Nur Sp1 UW, Su2 UW	
Year 4	• 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 6	• 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**.**	Electricity, Volts Series circuit **Components**: battery, bulb (lamp), bulb (lamp) holder, buzzer, crocodile clip, leads, wires, switch **Describing words**: brighter, duller, slow, fast, quiet, loud Conductor, insulator Resistance **Effects of electricity**: Light, sound, movement, heat

	Sound	Vocabulary

Year 4	• Identify how sounds are made, associating some of them with something vibrating • Recognise that vibrations from a 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.	

	States of Matter	Vocabulary
EYFS	• To talk about the differences between materials and changes they notice. Nur Au2 UW • Explore the freezing and evaporation of water by describing what they see, hear and feel while outside Rec Sm2 UW	
Year 4	• 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.	
Year 5	• Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating • 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.	**Dissolving** – Solvent, solution, solute, soluble, insoluble, solid, liquid, particles, suspensions **Separating materials** – Sieve, filter, evaporate, condense

	Earth and Space	Vocabulary
Year 5	• 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	Day and night: Earth, axis, rotate

	• 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	Solar system: Star = Sun, Planets = Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune (Pluto was classified as Dwarf planet in 2006) Phases of the Moon: full moon, gibbous moon, half moon, crescent moon, new moon, waxing ,waning Moon's orbit: 29.5 days, lunar month Orbit, planets, revolve, sphere
	Evolution and Inheritance	**Vocabulary**
Year 6	• 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.	Evolution, evolve Natural selection Survival Reproduction Offspring, parents, siblings Environment Variation Fossils; ammonites, belemnites, micrasters, etc

	Working Scientifically	Vocabulary
EYFS	• Use all senses to explore natural materials. Nur Au1 UW, informally taught and supported across all adult – child engagement • Explore how things work. Nur Au1 UW, Sp1 UW • Talk about the differences they notice.. Nur Au2 UW, Sp1 UW, Su2 UW • Describe what they see, hear and feel while outside Planned in Rec Sm2 UW, but informally taught and supported across all adult – child engagement	Look, listen, hear, feel, rough, smooth, natural, man-made, wood, plastic, metal……
Year 1 Year 2	• asking simple questions and recognising that they can be answered in different ways • observing closely, using simple equipment • performing simple tests • identifying and classifying • using their observations and ideas to suggest answers to questions • gathering and recording data to help in answering questions	
Year 3 Year 4	• asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative and fair tests • making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions • recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings.	

Year 5 Year 6	• planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been used to support or refute ideas or arguments	Variables, independent variable, scatter graph, line graph, fair testing, correlation, causal relationship, conclusion, prediction, scientific theory, observation,