RPS Curriculum Progression of Scientific Knowledge

	EYFS	YR 1/2	YR 3/4	YR 5/6
Plants	• To know what a plant is	• To name these parts of a plant – root, stem, leaf, flower	• To know that leaves makes food for the plant • To know that stems support leaves transports water and nutrients up from roots • To know roots anchor a plant to the ground and suck water up through tiny straw like hairs which absorb water	
	• To notice similarities and differences between plants around them • To know that different plants grow in different places e.g. garden and woodland	• Know the names of some wild plants e.g. buttercup, dandelion • Know where to find wild plants • Know the names of some common garden plants e.g. tulip, rose • Know where to find garden plants	• To know that there are many varieties of plants	
	• To know what a plant needs to grow e.g. water, food and light • To know what will happen to a plant if it doesn't have light, food or water	• Know what plants need to stay healthy and why • Know what happens when plants do not get what they need and why	• To know plants have specific functions using MRSGREN • To understand the process of photosynthesis • To know that glucose is self-made food and is transported around the plant to help make new roots, stems, leaves and flowers.	
	• To know that a plant comes from a seed • To notice similarities and differences between a seed and a bulb	• Understand the process of germination from seed to plant • Understand how bulbs grow differently to seeds	• To know that a flowers purpose is to attract insects to cause pollination and its job is to make seeds.	
		• Know what makes a tree including bark, trunk, crown • Know the names of different types of trees • Know that some trees are evergreen and some trees are deciduous	• To know that plants excrete oxygen for life to exist on Earth	
Animals (including humans)	• To know what an animal is and name some	• To know what an animal is and the groups of animals there are including mammals, fish, reptiles, amphibians, birds	• Humans are animals that eat plants and other animals	
	• To describe similarities and differences between animals e.g. a whale lives in water, an elephant lives on land	• Describe the characteristics of each group of animals • Be able to describe some similarities and difference between the groups of animals • To describe an animal using terms vertebrate/invertebrate • To know specific functions that an animal has (MRSGREN)	• Vertebrates are animals with a back bone • Invertebrates are animals without a back bone	
	• To name the 5 senses and say what they do	• To know a human is an animal and has five senses • To know how a human uses its senses		

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	• To know what a lifecycle is – frog/butterfly	• To know that animals change through a life cycle and why	• To know that there are male and female parts of a flower. • To name the male parts stamen, anther, filament • To name the female parts ovary, style, stigma, pastil • To recognise that pollen is a fine powder made by the anther its genetic code to make a seed • To know that insects are vital for pollination • To know that pollination is the transfer of pollen to itself or to another flower from anther, stigma, style or ovary	• To know the similarities and difference in life cycles between a mammal and amphibian focusing on: *sexual reproduction, classification (vertebrate/invertebrate), gestation, birth and how they grow/mature* • To know the similarities and difference in life cycles between an insect and a bird focusing on: *sexual reproduction, classification (vertebrate/invertebrate), gestation, birth and how they grow/mature* • To compare and contrast the similarities and difference in life cycles between a mammal, amphibian, insect and bird focusing on: *sexual reproduction, classification (vertebrate/invertebrate), gestation, birth and how they grow/mature* • To understand that all living species make copies of themselves to ensure the survival of the species. • To understand that sexual reproduction involves male and female • Sexual reproduction ensures variation within the species • Asexual reproduction is without male + female • Asexual reproduction makes an identical copy of the parent (animal or plant) • In plants, male reproduction cells are called pollen • In plants, female reproduction cells are called ovule • In plants, seeds are produced, germinate and create seedlings • In plants, understand that bulbs and runners are types of asexual reproduction
	• To know how humans, change from birth, in relation to themselves (birth to 5)	• To know how humans, change as they mature		• To understand that the individual stages that make up the human timeline • To know that adolescence is a stage of change from child to adult • To understand when puberty starts in each gender • Recognise some physical changes of puberty and how they are similar and different between the genders • Understand the importance of the puberty process

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				• Length of human gestation period is 40weeks • Identify the length of an animal's gestation period (e.g. elephant = 95 weeks) • Compare human and animal gestation periods • Understand and compare life expectancy of a human vs animal (e.g. human 79years, butterfly 2weeks)
	• To know what animals, eat • To know what animals, need to stay alive e.g. water, food + air	• To know what animals need to do to stay alive and why • To know the different types of food humans eat and how they keep us healthy • To understand what a food chain is • To know why animals and plants need each other using key vocabulary prey/predator, consumers/producer To know what animals eat, which type of food group they eat and why	• Carbohydrates gives us energy they include, bread cereals vegetables sugar and should be consumed more • Fats provides energy and helps nerves and the brain. It helps to absorb vitamins but should be consumed less • Protein helps us to grow, this includes meat and fish eggs and dairy • Vitamins minerals fibre helps keeps us healthy. Such as fruit and vegetables which should be consumed as part of your 5 a-day • Water blood, muscles and organs need water to work. Water is a large component as muscles are 79% water • The food pyramid gives a guide on how these categories should be consumed. You should eat more of the lower layers and eat less of the top layers • tongue moves food taste pushes bolus into the oesophagus • saliva liquid in mouth enzymes break food down taste • food torn crushed small pieces = bolus oesophagus teeth and saliva prepare the food for digestion	• To know kidneys are located either side of the spine and that kidneys clean the blood • To know that blood enters the kidneys and filters out waste substances (toxins) that the body does not need • To recognise that toxins must be dissolved in liquid to be excreted so they are transformed into urine using water • To recognise that dehydration could be thirst, dry mouth, headache, decreased urination as water makes up 75% of our body. • Plasma is mainly water and a liquid that blood cells are suspended in and waste is carried • To know that red blood cells carry oxygen to cells in the body. It takes oxygen and exchanges it for carbon dioxide • To understand white blood cells defend us and attack threats that could make us ill • To recognise platelets clot together to stop blood leaking out when wounds occur • To recognise that cells in our bodies need to feed, grow and multiply • To know that cells feed by getting nutrients through cell walls • To understand important nutrients are carbohydrates, fats, proteins, vitamins, minerals, water and fibre • To know the circulatory system is the heart, lungs, arteries, veins and capillaries • To know the right side of the heart receives blood from the body and sends it to the lungs

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				• To know the left side of the heart receives blood from the lungs and pumps it away from the heart •
	• To know what humans need to do to stay healthy e.g. healthy eating, exercise, brushing teeth and hand washing	• To understand why humans need to exercise	• Skeleton supports and protects organs and blood travels through bones. • We control our skeletal muscles- voluntary movement • We don't control the muscles of our heart, intestines or our bladder- involuntary movement • Biceps and triceps work in opposition we contract our biceps when we bend our arm and contract our triceps when we straighten our arm	• To understand that healthy means eating the right foods to keep our body functioning effectively
			• Animals including humans have incisor/canines/pre-molars/molars and what they do • Children have 20 teeth and adults have 32 teeth • Herbivores have incisors and lots of molars • Carnivores have incisors, canniness and a few molars • To know that teeth cut, rip, grind • To know that enzymes break food down using saliva liquid in the mouth • To understand teeth and saliva prepare food for digestion • Food is torn, crushed into small pieces and sent down the oesophagus in a bolus	
Living Things & Their Habitats	• To describe similarities and differences between living things.	• To explain using MRS GREN what makes something alive/living • To know which things have never been alive • To know what living things (animals, humans, plants) have in common	• Characteristic of living things - MRS GREN Movement Respiration Sensitivity Growth Reproduction Excretion Nutrition • Biodiversity- enormous variety of life on earth • Organism is a single living thing. • Vertebrates means having a backbone, sometimes called a spine. Categories of vertebrates include; fish, amphibian; mammal; reptiles; birds • Invertebrates means without backbone. Categories of invertebrates include; insects; annelids; arachnids; molluscs. • Plants are classified as flowering and non-flowering. • non-flowering plants reproduce using spores and seed cones	• Linnaeus classification focusing on subgroups under headings of **Kingdoms, Phylum** and **Class** • Vertebrates all have a backbone • Vertebrates can be grouped in **Amphibians, Birds, Fish, Mammals** and **Reptiles** • Invertebrates have no backbone • Invertebrates can be grouped in **Annelida, Mollusc, Arachnida, Insects, Sponges, Starfish, Sea Urchins, Jellyfish** and **Flatworms** • Understand that Earth's timeline is very, very long – First life, Fish, Land Plants, Amphibians, Reptiles, Dinosaurs, Mammals, Birds and then Modern humans • Variation is differences within the same species

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			• Carl Linnaeus invented the way to classify living things in 1737 through taxonomy. • Linnaeus created a taxonomy a hierarchy of biological classification – here are the top three layers Kingdom animal, plant, fungi… Phylum invertebrates, vertebrates… Class mammal, reptile, fish…	• Diversity is differences between species • Variation is not diversity and there is no variation between species
	• To know that animals live in different places. • To describe habitats and animals in their local environment.	• To know what a habitat is including microhabitat, woodland habitat • To explain some different types of habitats • To know the habitats and animals that live in their local environment	• Habitats are a natural place where an organism lives Environment conditions and surroundings that affect survival and growth of living things Ecosystems are how living things interact with their habitat and environment. The role of an organism in an ecosystem is called their niche. A garden spider hunts for prey amongst plants.	• Charles Darwin theorised that species changed over time • Natural Selection is where living things with inherited characteristics, that favour survival, leave more offspring. The favourable characteristics increase over generations • Survival of the fitter is where if a species could not adapt or change, this led to extinction.
Seasons and weather	• Know that there are four seasons and name them. • Can describe something specific for each season eg weather changes, what they do in each season • Can describe the weather using appropriate language eg rain, sun, cloudy, windy, snow, storm, fog	• Know that there are four seasons and they are in a cycle • Know that each season is different and why • Know what the weather is like in each season and why		• Seasons are determined by the Earths tilt • When we tilt towards the sun, the sun appears higher in the sky • When we are titled away from the sun, the sun appears lower in the sky
Earth & The Solar System	• To be able to differentiate between day and night. • To describe what they do in the daytime and what they do at night time.	Know that the Earth spins so that day becomes night		• Each planet spins on an axis • The earth turns one full rotation in 24 hours • Earth spins anti-clockwise • Understand and describe the different stages of a the suns position – sunrise, midday, sunset and night
	•			• Understand that planets in our solar system orbit the sun • Name and understand key characteristics about the 8 planets of the solar system (e.g. size, composition and orbit length)
				• To describe how our view of the moon changes in a lunar month • The moon doesn't change shape • Our view of the moon changes as it orbits Earth

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				• The stages of the lunar cycle including waxing, waning, crescent, gibbous • Give the order for the lunar cycle
Light			• Identify sources of light including sun, candle, torch.	
			• We see when light reflects off a surface and enters our eyes.	• Light travels in straight lines • When light reflects from an object, it continues to travel in a straight line but in a new direction • The angle that light hits the mirror (angle of incidence) is the same as it leaves the mirror (angle of reflection)
			• Shadow is a dark shape formed when an opaque object blocks a light source. • Opaque means an object that light cannot pass through. • Transparent means light can pass through it. • Translucent means some light can travel through. • The size of a shadow is changed by variables including distance of light source to object.	• Shadows are formed in the absence of light and have the same shape as the object that cast them
				• White light can be split into a visible spectrum • Refraction is when the water is denser the air so light slows down when it enters the water and changes direction (but does not bend)
Electricity			• Mains electricity is supplied to a building by wires.	• Electricity is a form of energy • Atom contain electrons • The nucleus contains protons and neutrons
			• A battery is portable source of stored energy.	• The power source gives energy to electrons which can make them move around a circuit (current) • Conductors allow electrons to move • Insulators do not allow electrons to flow
			• Simple components of a circuit are; battery (cell), bulb (lamp), motor, switch, buzzer and wire.	• A series circuit contains a battery and a bulb • Draw a series circuit using diagrams such as battery, bulb, motor, switch and buzzer • An open circuit has no flow • A closed circuit has a flow of electrons as they repel against each other • Current is the flow of electrons moving around an electrical circuit

Forces and magnets			• A contact force occurs when two objects physically touch such as a boot + football = contact force • Contact forces push or pull • Resistance is a force that slows down an object that is moving. forces act in opposite directions. Different materials have an effect on how an object moves. • A force meter measures resistance friction in Newtons (N).	• Friction is a force that always opposes the direction of an objects movement • Understand the role of friction and when it is helpful or unhelpful (e.g. helpful –brakes on a bike, unhelpful – chain on bike getting stuck) • Air resistance a type of friction that opposes the movement of an object through the air • Understand that air resistance is affected by surface area and speed • Water resistance is a push that occurs when an object moves through the water Upthrust is a force that acts upwards on objects in liquid or gas • The shape of the object changes the amount of water that it displaces • More liquid or gas displaced = more upthrust
			• A non-contact force is A force that acts on an object without touching it. • Gravity is a non-contact force that pulls things to the ground. • Magnetism non-contact force and is the invisible push or pull that works between some materials. • Magnets have an invisible force field that repels or attracts certain materials- North and South. • Ring, bar or horseshoe magnets all have north and south poles • Any material made of iron or steel are magnetic as magnetic field will only act on materials made of iron or steel • Not all metals are magnetic aluminium and copper do not contain iron or steel. • Magnetic force can work through water •	• All levers have load, arm or rod, pivot and fulcrum • Levers are force multipliers that give us a mechanical advantage • A pulley is a mechanism to help move heavy things • A pulley has a grooved wheel, axle and rope • Understand how a pulley helps move heavy things • Recognise that gears give us a mechanical advantage • Notice and observe gears on a particular object e.g bicycle • Gears help to increase or decrease effort needed to make an object move

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Sound			• sound is a very quick vibration travels as waves • sound waves can ONLY travel through a medium such as: • gas (air) • liquid (water) • solid (wood) • sound travels as vibrations through anything with particles sound | you can hear | see vibrations | feel vibrations • Vibrating sound waves move through the medium of a gas, liquid or solid. • sounds get fainter energy spreads out as it travels | gets fainter over larger areas • pitch how high or low sounds are | measured in Hertz (Hz) like 'centimetres' for sound | means the number of sound waves that are produced in 1 second • 3 things that affect pitch • size • length • tightness | of the thing that is vibrating	
Materials and their properties	• Recognise things are made from different materials.	• Name different types of materials including wood, metal and paper. • Identify different materials in a school environment.	• Rocks are natural, not made by humans.	
	• Learn some correct language to describe materials. E.g. rough, smooth, metal, wood, waterproof	• Describe the properties of different materials using appropriate vocabulary.	• Rocks are in three categories; sedimentary; metamorphic; igneous.	• Know some of the properties of materials: conductor, insulator, hardness, solubility, transparency and magnetism. • Sort materials according to these properties.
	• Use play to explore and investigate materials and their properties.	• Explain which material is best to use for certain things. • Select the correct material for its use and why. • Explain why more than one material is used to make certain things.	•	• Understand how we use materials based on their properties. E.g. Copper in pots ensures heating of food.
	• Explore what happens when they manipulate a material and describe what happens. E.g. squashing playdoh, scrunching paper.	• Know what happens to materials when you bend, squash, twist or stretch them.	• Sedimentary rocks are formed through deposits of tiny grains of pebbles and are squashed together over millions of years. • Metamorphic rocks changed because they have been squashed and heated. • Igneous and sedimentary rocks can change into metamorphic rocks. • Igneous and sedimentary rocks are changed and reformed. • Calcium carbonate in chalk and limestone will react to acids to produce carbon dioxide. • Soil is made up of tiny pieces of broken rocks, decaying materials and microorganisms.	•

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			• Materials are not permanently solid they can change state, depending on the temperature.	
		• Know which materials are waterproof and which are not. • Understand what absorbent means. • Understand what waterproofing is.	•	
			• Fossils are the remains of prehistoric life. (Covered quickly + body not broken up)	
States of Matter			• Matter is something that takes up space, despite its size or composition. E.g. ice, water, air anything that exists is called matter. • Matter has mass and volume. • State is one of three distinct ways matter exists; solid, liquid or gas. • Solid can't flow/ has a fixed volume/ particle are very close together.	• Know that there are various types of mixtures (Liquid + Salt, Solid + Solid and Liquid + Liquid). • Understand the states of matter; solid, liquid and gas.
			• Liquid takes the shape of the container/ can flow/ has a fixed volume/ particle very close but not fixed.	• A solution is materials that combined e.g. salt and water. • Salt is a solute because it is soluble. • Dissolving in a solution is a physical change and understand how to reverse it. • Melting solid to a liquid is physical change and understand how to reverse it.
			• Liquids can change states through evaporation or freezing. • Gases can change state through condensation.	• Freezing liquids into a solid is a physical change and understand how to reverse it. • Evaporating liquid into vapour is a physical change and understand how to reverse it.
			•	• Understand that an irreversible change is a chemical reaction- cannot get it back.