St Peter's CE (VA) Primary School

Curriculum Progression Map – Science

Topic	EYFS	Year 1/2	Year 3/4	Year 5/6	KS3
Plants • I can identify and name a variety of plants. • I can identify and describe the structure of a plant. • I understand how plants grow. • I can find out what a plant needs to grow. • I understand how different parts of the plant work. • I can investigate how water is transported within plants. • I understand the affect of the environment on living things. • I understand how animals and plants are adapted to suit their environment.	• Show understanding that we need to care for living things, e.g. watering plants, handling insects gently. • Discuss change in seasons from Summer > Autumn, and then Autumn > Winter. Refer to changes to the natural world, weather and our habits. • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.	• Identify common wild and garden plants, including deciduous and evergreen trees by their characteristics including the structure of a variety of common flowering plants, including trees. • Identify changes across seasons • Observe and describe weather associated with the seasons and how day length varies. • Observe and describe how seeds and bulbs grow into mature plants. This is to be done by an observation over time germination experiment. -Soil no water -No soil and water -No soil and no water Does a plant need suitable temperature to grow? • Describe how plants need water, light and a suitable temperature to grow and stay healthy. • I can identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. • Identify and name a variety of plants and animals in their habitats, including micro-habitats.	• Identify and describe the functions of different parts of flowering plants including the roots, stem/trunk, leaves and flowers. • Investigate the way in which water is transported within plants. • Water transport investigation using celery and food colouring. • Recognise that environments can change and that this can sometimes pose dangers to living things. • Identify and describe the functions of different parts of flowering plants including the roots, stem/trunk, leaves and flowers. • Investigate the way in which water is transported within plants. • Water transport investigation using celery and food colouring. • Recognise that environments can change and that this can sometimes pose dangers to living things.	• Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. • 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. • Investigation/germination experiment with cress seeds. -soil water no light -soil water and light -No soil, just water no light -No soil water and light -No soil water or light Investigate temperature as well. • Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lean to evolution.	**Biology** • cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope • the similarities and differences between plant and animal cells • the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms. • plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots. • the role of leaf stomata in gas exchange in plants. • reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. • the reactants in, and products of, photosynthesis, and a word summary for photosynthesis • the dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere • the adaptations of leaves for photosynthesis. • aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life

					• the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops
Animals • I can identify and name a variety of common animals. • I know what an animal eats. • I understand that animals have offspring. • I understand how a food chain works. • I know what an animal/human needs to survive. • I can describe the structure of different animals. • I know how we digest food.	• Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter. • Show understanding that we need to care for living things, e.g. watering plants, handling insects gently. •	• 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 common animals including fish, amphibians, reptiles, birds and mammals and their habitats including micro habitat. • 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. • Explore and compare the differences between things that are living, dead, and things that have never been alive. • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. • 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. • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets).	• 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 some animals have skeletons and muscles for support, protection and movement. • Construct and interpret a variety of food chains, identifying producers, predators and prey. • 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.	• Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. • Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. • 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. • Describe the ways in which nutrients and water are transported within animals.	**Biology** • cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope • the similarities and differences between plant and animal cells • the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms. • biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles • the tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts) • aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life • the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops • the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation • changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction
Humans •I can name parts of the body	• Talk about people around them in good detail, describing their roles,	• Identify, name, draw and label the basic parts of the human body and say which	• Describe the simple functions of the basic	• Recognise that living things have changed over time.	**Biology** • cells as the fundamental unit of living organisms, including how to observe,

and its systems •I know why diet and exercise is important •I know how living creatures produce offspring of their kind •I know what humans need to survive	interests or news about them. • Discuss past and upcoming events within their own family. •	part of the body is associated with each sense. • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. • 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 and how they rely on each other (water, food and air).	parts of the digestive system. • Identify the impact of different diets, exercise, drugs and lifestyle on the ways our bodies function. • Identify that humans need the right types and amount of nutrition and that they cannot make their own food; they get nutrition form what they eat. • Identify and name the different teeth in humans and their simple function. • Identify that humans have skeletons and muscles for support, protection and movement Identify that some animals have skeletons and muscles for support, protection and movement.	• Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. • Describe the changes as humans develop to old age. • Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. • Describe the ways in which nutrients and water are transported within animals, including humans.	interpret and record cell structure using a light microscope • the similarities and differences between plant and animal cells • the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms. • the structure and functions of the human skeleton, to include support, protection, movement and making blood cells • biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles • content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed • calculations of energy requirements in a healthy daily diet • the tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts) • the importance of bacteria in the human digestive system • the structure and functions of the gas exchange system in humans, including adaptations to function • reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta • aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life

					• the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops • heredity as the process by which genetic information is transmitted from one generation to the next • a simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model • the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation • changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction
Materials •I know that there are different kinds of materials •I can name different materials and their properties •I understand that different materials are suited to a specific purpose. •I understand how materials can be manipulated. •I can group materials according to their properties. • I can describe how	• Talk about differences between materials and changes they notice in simple terms, e.g. when cooking, melting ice etc. • Talk about forces they feel, e.g. water pushing a boat up to float, elastic bands stretching, magnets. • Use their senses to explore natural materials and describe what they observe, e.g. "a heavy log" "wet leaves".	• 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. • 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 • 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	• 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.	• Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. • 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. • Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.	**Chemistry** • the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure. • changes of state in terms of the particle model. • a simple (Dalton) atomic model • differences between atoms, elements and compounds • chemical symbols and formulae for elements and compounds • conservation of mass changes of state and chemical reactions. • the concept of a pure substance • mixtures, including dissolving • diffusion in terms of the particle model • simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography • the identification of pure substances. • chemical reactions as the rearrangement of atoms • representing chemical reactions using formulae and using equations • combustion, thermal decomposition, oxidation and displacement reactions

materials change under different conditions.		physical properties and suitability for a purpose.			• defining acids and alkalis in terms of neutralisation reactions • the pH scale for measuring acidity/alkalinity; and indicators • reactions of acids with metals to produce a salt plus hydrogen • reactions of acids with alkalis to produce a salt plus water • what catalysts do. • energy changes on changes of state (qualitative) • exothermic and endothermic chemical reactions (qualitative). • the varying physical and chemical properties of different elements • the principles underpinning the Mendeleev Periodic Table • the Periodic Table: periods and groups; metals and non-metals • how patterns in reactions can be predicted with reference to the Periodic Table • the properties of metals and non-metals • the chemical properties of metal and non-metal oxides with respect to acidity. • the order of metals and carbon in the reactivity series • the use of carbon in obtaining metals from metal oxides • properties of ceramics, polymers and composites (qualitative). • the composition of the Earth • the structure of the Earth • the rock cycle and the formation of igneous, sedimentary and metamorphic rocks • Earth as a source of limited resources and the efficacy of recycling • the carbon cycle • the composition of the atmosphere • the production of carbon dioxide by human activity and the impact on climate. **Physics** • heating and thermal equilibrium: temperature difference between two objects leading to energy transfer

					from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference: use of insulators • other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels. • energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change • comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with movements, temperatures, changes in positions in a field, in elastic distortions and in chemical compositions • using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes. • conservation of material and of mass, and reversibility, in melting, freezing, evaporation, sublimation, condensation, dissolving • similarities and differences, including density differences, between solids, liquids and gases • Brownian motion in gases • diffusion in liquids and gases driven by differences in concentration • the difference between chemical and physical changes. • changes with temperature in motion and spacing of particles • internal energy stored in materials. • the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density, the anomaly of ice-water transition • atoms and molecules as particles.

Curriculum Progression Map – Science KS2

Topic	LKS2	UKS2	KS3
Electricity • I can identify common electrical appliances • I can construct circuits including a bulb, buzzer, switch and battery. • I can recognise electrical symbols	• 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.	• 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. • 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.	**Physics** • Energy: comparing energy values of different foods (from labels) (kJ) • comparing power ratings of appliances in watts (W, kW) • comparing amounts of energy transferred (J, kJ, kW hour) • domestic fuel bills, fuel use and costs • fuels and energy resources. • electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge • potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current • differences in resistance between conducting and insulating components (quantitative). • separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects • the idea of electric field, forces acting across the space between objects not in contact.
Space • I understand the movement of Earth • I understand the movement of the moon • I understand why we have day and night • I understand why objects fall to Earth • I understand we need light to see • I understand the dangers of looking at the sun	• 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.	• Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. • Recognise that they need light in order to see things and that dark is the absence of light. • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.	**Physics** • gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only) • our Sun as a star, other stars in our galaxy, other galaxies • the seasons and the Earth's tilt, day length at different times of year, in different hemispheres • the light year as a unit of astronomical distance.

Forces • I understand that some forces require contact and others don't. • I understand that magnets repel and attract • I know that magnets have two poles • I understand that there are forces of resistance	• 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. • Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. • Compare how things move on different surfaces.	• 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. • 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.	**Physics** • simple machines give bigger force but at the expense of smaller movement (and vice versa): product of force and displacement unchanged • speed and the quantitative relationship between average speed, distance and time (speed = distance ÷ time) • the representation of a journey on a distance-time graph • relative motion: trains and cars passing one another. • forces as pushes or pulls, arising from the interaction between two objects • using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces • moment as the turning effect of a force • forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water • forces measured in newtons, measurements of stretch or compression as force is changed • force-extension linear relation; Hooke's Law as a special case • work done and energy changes on deformation • atmospheric pressure, decreases with increase of height as weight of air above decreases with height • pressure in liquids, increasing with depth; upthrust effects, floating and sinking • pressure measured by ratio of force over area – acting normal to any surface. Balanced forces • opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface. Forces and motion • forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only) • change depending on direction of force and its size. • magnetic poles, attraction and repulsion • magnetic fields by plotting with compass, representation by field lines

			• Earth's magnetism, compass and navigation • the magnetic effect of a current, electromagnets, D.C. motors (principles only).
Light/Sound • I know that light reflects off surfaces • I know that light travels in straight lines • I know how we see things • I understand we hear through vibrations • I understand how distance affects sound • I understand that sound has different pitches • I know why shadows form and are a particular shape	• Notice that light is reflected from surfaces. • Recognise that light appears to travel in straight lines. • 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. • Identify how sounds are made, associating some of them with something vibrating. • Recognise that vibrations from sounds travel through a medium to the ear. • Recognise that sounds get fainter as the distance from the sound source increases.	• 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 size of shadows change. • 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. • Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. • 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	**Physics** • waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition. • pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound; waves transferring information for conversion to electrical signals by microphone. • the similarities and differences between light waves and waves in matter • light waves travelling through a vacuum; speed of light • the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface • use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye • light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras • colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection.