PATHFINDER SCHOOLS
Inspiring greatness

Concept Progression for Science Cycle A & Cycle B				
Key Scientific Concepts	**EYFS**	**Years 1 and 2**	**Years 3 and 4**	**Years 5 and 6**
Light & Seeing (Physics) **Eyes See**		**Animals, including humans (Body senses)** • Children identify parts of the human body, including eyes. They will understand that eyes enable you to see.	**Light** • Children will learn that the sun is dangerous for eyes and that there are ways to protect our eyes.	
Light & Seeing (Physics) **Light**			**Light** • Children learn that we need light to recognise things and that darkness is the absence of light. • Children learn that light travels in straight lines and enters our eyes so we can see. (no diagram)	**Light** • Children learn that light travels in straight lines and enters our eyes so we can see, (with diagram.) • Explain that we see things because light travels from a light source to our eyes or from an object and then to our eyes. (Mirror diagrams.)

				• To know how a prism changes a ray of light to show the spectrum.
Light & Seeing (Physics) **Reflection**			**Light** • Notice that light is reflected from surfaces, (shiny surfaces, mirrors,) (Don't do mirror diagrams.) •	• Explain that we see things because light travels from a light source to our eyes or to an object and then to our eyes. (Mirror diagrams.)
Light & Seeing (Physics) **Shadows**			**Light** • Recognise that shadows are formed when the light from a light source is blocked by an opaque or translucent object. • Find patterns in the way shadows change size.	**Light** • Use the idea that light travels in straight lines to explain why shadows have the same shape as an object.
Investigate Materials including Rocks, Soils and Fossils (Chemistry)		**Everyday materials** (Y1) • Distinguish between objects and the material they are made of	**Rocks and Soils** • Know about different types of soil.	

Materials and their Functions		• Identify and name different materials.		
Investigate Materials including Rocks, Soils and Fossils (Chemistry **Properties**	Use their senses in hands on exploration of natural materials. (3-4) Explore collections of materials with similar or different properties. (3-4) Talk about what they see, using a wide vocabulary (3-4). Talk about the differences between materials	• Describe the simple properties of a variety of everyday materials, (hard, soft, rough and smooth, shiny and dull, rigid and flexible, absorbent and non-absorbent, stretchy, elastic, transparent and opaque and waterproof and non-waterproof.) • Compare and group together a variety of everyday materials on the basis of their simple physical properties. • Recap properties of materials (wood, glass, plastic, metal, paper, cardboard, fabric, rubber). • To understand why particular materials are used for different purposes e.g. glass for a window. (Link to properties.)	**Rocks and Soils** • Describe, compare and group together different kinds of rocks on the basis of their appearance and simple physical properties, (hard soft, rough, smooth, texture flexible, rigid, shiny, dull, transparent, opaque, particle/grain size, crystalline or not,) • Know that some rocks are durable. • Know that some rocks are permeable/porous.	**Materials and their properties** • To know how to use scientific language that relates to properties of materials, (hardness, solubility, transparency, conductive properties, thermal properties.) • To know what the terms soluble and insoluble mean. • To know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution • To show my understanding of

				materials and their properties.
Investigate Materials including Rocks, Soils and Fossils (Chemistry **Change**		**Use of Materials (NC Y2)** • To explore how materials can be changed by squashing, bending, twisting and stretching.	**States of Matter** • Know that materials change state when they are heated or cooled and know the temperature at which this happens in degrees Celsius (°C) for water • Understand the processes of melting, freezing, evaporation and condensation. • Identify the part played by evaporation and condensation in the water cycle.	**Materials and their properties** • To know what an irreversible change is and that it can form a new material. • To understand the difference between heating and burning.

Investigate Materials including Rocks, Soils and Fossils (Chemistry **Alive or Dead**		• To identify and sort objects/materials which are living, dead, and things that have never been alive.)	**Rocks and Soils** • Recognise that soil is made from rocks and organic material.	
Investigate Materials including Rocks, Soils and Fossils (Chemistry **Fossils**			**Rocks and Soils** • Describe in simple terms how fossils are formed when things that have lived are trapped within rock. • Explain Mary Anning's contribution to palaeontology.	
Investigate Materials including Rocks, Soils and Fossils (Chemistry) **States of Materials: Solids, Liquids and Gases**			**States of Matter** • Identify solids, liquids and gases. • Looking at their properties, (solids = fixed shape, cut or torn, liquids = pour, fit container, gases = no fixed shape, fill space.) • Know that gases have mass.	**Materials and their properties** • Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.

Investigate Materials including Rocks, Soils and Fossils (Chemistry **Temperature and its Effects**			**States of Matter** • Know that materials change state when they are heated or cooled and know the temperature at which this happens in degrees Celsius (°C) for water. • Associate the rate of evaporation with temperature. • Understand the processes of melting, freezing, evaporation and condensation. • Identify the part played by evaporation and condensation in the water cycle.	**Materials and their properties** • To understand the terms thermal conductor and thermal insulators.

Movement, Forces and Magnets **Types of Forces**	• Participate in small group, class and one-to-one discussions, offering their own ideas, using recently introduced vocabulary; ELG • Offer explanations for why things might happen ELG • Understand how things work. 3-4 • Explore and talk about forces they can feel 3-4		**Forces and Magnets** • Identify the forces acting on objects, (pushes and pulls.) • Notice that some forces need contact between two objects and that some forces act at a distance.	**Forces** • To know what gravity and resistance are and identify balanced and unbalanced forces • Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object

Movement, Forces and Magnets **Using Forces: Pulleys, levers and gears.**	•			**Forces** • Recognise that gear mechanisms allow a smaller force to have a greater effect • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.
Movement, Forces and Magnets **Friction and Resistance**	•		**Forces and Magnets** • Explore movement across different surfaces/friction	**Forces** • Identify the effects of friction, that acts between moving surfaces • Identify the effects of air resistance, water resistance and friction, that act between moving surfaces

Movement, Forces and Magnets **Magnetic Forces: Attraction and Repulsion**			**Forces and Magnets** • Magnets attract some materials but repel others, (iron, nickel and cobalt) • Describe magnets as having two poles. • Magnets attract or repel each other. • Compasses use magnets to determine direction.	
Electrical Circuits (Physics) **Electrical Appliances and Safety**			**Electricity** • Identify common appliances that run on electricity. • Electricity can be dangerous.	
Electrical Circuits (Physics) **Electrical Components**			**Electricity** • Construct a simple series electrical circuit, identifying and naming its basic parts, including batteries, wires, bulbs, switches and buzzers.	**Electricity** • Use recognised symbols when representing a simple circuit in a diagram.

Electrical Circuits (Physics) **Circuits**			**Electricity** • 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/bulb lights in a simple circuit.	**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
Electrical Circuits (Physics) **Insulators and Conductors**			**Electricity** • Recognise some common conductors and insulators and associate metals with	

			being good conductors.	
Sound (Physics) **Vibrations make sound**	Types of Sound.		**Sound** • Identify how sounds are made by vibrations. • Recognise that vibrations from sounds travel through a medium to the ear.	
Sound (Physics) **Hearing**	Perform songs, rhymes, poems and stories with others, and – when appropriate try to move in time with music. ELG	**Animals, including humans (Body senses)** • Identify, name, draw and label the basic parts of the human body. • Name the part of the body associated with each sense covering sight, hearing, touch, taste, feel.	**Sound** • How we hear.	
Sound (Physics) **Pitch**	Perform songs, rhymes, poems and stories with others, and – when		**Sound** • High notes are made by short lengths/tight objects whereas	

	appropriate try to move in time with music. ELG		low notes are made by long lengths/loose objects.	
Sound (Physics) **Volume**	Perform songs, rhymes, poems and stories with others, and – when appropriate try to move in time with music. ELG		**Sound** • The harder you hit an object, the louder the sound. Gentle strikes make quieter sounds.	
Sound (Physics) **Sound and distance**			**Sound** • Recognise that sounds get fainter when the distance from the sound source increases. • Identify aspects of science used within particular jobs or roles, (Alexander Bell and the telephone.)	

Sound (Physics) **Soundproofing**			**Sound** • Materials with air pockets such as sponge or bubble wrap insulate against sound. (Soundproofing.)	
Understanding Evolution and Inheritance **Human Life Cycle: Inheritance and Variation**		**Animals, including humans (Y2)** • Notice that animals, including humans, have offspring which grow into adults.		• Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents in the context of inheritance

Understanding Evolution and Inheritance **Adaption and Evolution**		**Living things and their habitats** • Describe how animals are suited to different habitats.		• Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. • Identify how adaptation may lead to evolution by examining the theories of evolution constructed by Darwin and Wallace. • Identify the advantages and disadvantages the role of human intervention has on the process of evolution. •

Understanding Evolution and Inheritance **Fossils and Fossilisation**			**Rocks and Soils** • Describe in simple terms how fossils are formed when things that have lived are trapped within rock. • Explain Mary Anning's contribution to palaeontology.	**Living Things – Evolution and Inheritance** • Recognize that living things have changed over time and that fossils provide information about living things that inhabited the

				Earth millions of years ago.
Understand the Earth's Movement in Space (Physics) **Seasonal Change**	Use all their senses in hands on exploration of natural materials. 3-4 Say what they can see, hear and feel when outside. R Explore the natural world around them. R Understand the effects of the changing seasons on the world around them.R Understand some important processes and	**Seasons – Autumn** • There are 4 seasons. Winter, Spring, Summer and Autumn. • Explore local environment. Describe the changes, e.g. colours changing etc, changing weather conditions. • Identify and name a variety of deciduous and evergreen trees. (Plants Y1) • To observe signs of Autumn. • To observe signs of Winter. • To compare and observe patterns of weather during Winter. • To observe signs of Spring • To compare and observe patterns of weather during Spring. • To observe signs of Summer. • Compare season of Summer to previous knowledge of seasons, including the weather.		

	changes in the natural world around them, including the seasons and changing states of matter. (ELG)			
Understand the Earth's Movement in Space. (Physics) **Day Length**		**Seasons – Summer** • Seasonal patterns - changes in the length of a day. The length of the day is shorter in winter and longer in summer.		**Space** • To understand why the length of day and night changes during the year.
Understand the Earth's Movement in Space (Physics) **Movement of Earth, Sun and Moon.**			**Light** • Recognise that shadows are formed when the light from a light source is blocked by an opaque or translucent object. • Find patterns in the way shadows change size over a day.	**Space** • To know the movements of the earth, moon and sun. • To understand how the earth faces the sun at different times of the day.

Understand the Earth's Movement in Space. (Physics) **Size of Spherical Bodies**				**Space** • To understand the size differences between the earth, moon and sun and that they are spherical bodies. • To know the different phases of the moon. • To know the names of the planets. • To know the order of planets
Understanding Animals and Humans, (Biology) **Structure and Function of the Human Body.**		**Animals, including humans (Body senses)** • Identify, name, draw and label the basic parts of the human body. • Name the part of the body associated with each sense covering sight, hearing, touch, taste, feel.	**Nutrition and the Skeleton** • Identify that humans have skeletons and muscles for support, protection and movement. • Identify and name bones.	**Animals including Humans** (Y6) • Identify main parts of the circulatory system • Identify main functions of the circulatory system

			• Identify and explain the three main functions of a skeleton. • Know why we need muscles to move. **Teeth and Digestion** • Identify and name parts of the human digestive system: tongue, teeth, oesophagus, stomach, small and large intestines, liver, pancreas and rectum. • Explain the functions of the digestive system. • Identify the types and functions of teeth: incisors bite, canines rip and tear, premolars and molars grind.	• To describe and explain how nutrients are transported within animals including humans.

			• Understand the causes of tooth decay. • Know how to look after your teeth.	
Understanding Animals and Humans, (Biology) **Staying Healthy**	Be increasingly independent in meeting their own care needs, eg brushing teeth, using the toilet, washing and drying hands thoroughly. (3-4) Make healthy choices about food, drink, activity and tooth brushing. (3-4) Know and talk about different factors that support their overall health	**Animals, including humans (Y2)** • Understand the importance of staying healthy through hygiene, diet and exercise. (taught with bodies and senses unit) • Find out about and describe the basic needs of animals, including humans, for survival. (water, food and air) • Learn the 3 basic needs of animals for survival, including how to look after pets. • The importance of healthy life-styles, including healthy food, hygiene and exercise. (taught with bodies and senses unit)	**Nutrition and the Skeleton** • Recap that animals, including humans, cannot make their own food; they get nutrition from what they eat. • Explain how living things obtain food. • State why animals, including humans, need the right type and the right amount of nutrients.	Covered in PSHE • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. • Recognise the negative effect of substances on body e.g. drugs, alcohol, sugar, salt. • Recognise the positive effects of doing exercise and eating healthily on body.

	and well-being -regular physical exercise, healthy eating, tooth brushing, sensible amounts of 'screen time', having a good sleep routine, being a safe pedestrian. (R).			
Understanding Animals and Humans, (Biology) **Human Change**		**Animals, including humans (Y2)** • Notice that humans, have offspring which grow into adults. • Explore how animals change as they grow up, including humans. • Learn the life-cycle of animals and a human. **Animals, including humans (Y2)** • Explore how animals change as they grow up.		**Covered in PSHE** • Describe the changes as humans develop to old age by drawing a timeline to indicate stages in the growth and development of humans. • To describe the changes as humans develop

		• Learn the life-cycle of animals.		to old age in the context of the development of babies in their first year. • To describe the changes as humans develop to old age by comparing the changes that take place to boys and girls during puberty. • To describe the changes as humans develop to old age by understanding the changes that take place in old age.
Understanding Animals and Humans, (Biology) **Vertebrates Structure and Function**	Explore the natural world around them, making observations and drawing pictures of	**Animals, including humans (NC Y1)** • Name common animals including fish, amphibians, reptiles, birds and mammals. • Describe and compare the structure of a variety of	**Nutrition and the Skeleton** • Identify that some animals have skeletons and muscles for support,	•

	animals and plants; (ELG)	common animals including fish, amphibians, reptiles, birds and mammals. • Look at animal young and compare them to their adults.	protection and movement. • Identify and explain the three main functions of a skeleton. **Teeth and Digestion** • Look at other animal's teeth.	
Understanding Animals and Humans, (Biology) **Food Chains**		**Living things and their habitats (cold habitats)** • Describe how animals obtain their food from plants and other animals in order to survive. (food chains)	**Nutrition and the Skeleton** • Compare animals by their diet.	
Living Things and their Habitats. (Biology) **Environments**	Talk about what they see, using a wide vocabulary (3-4). Explore the natural world around them. (R)	**Living things and their habitats** • Name different animals in specific environments. • Describe how animals are suited to different habitats.		

	Say what they see, hear and feel when outside. (R). Describe their immediate environment using knowledge from observation, discussion, stories, non-fiction texts and maps; (ELG) Explore the natural world around them, making observations and drawing pictures of animals and plants; (ELG)			

	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; (ELG)			
Living Things and their Habitats. (Biology) **Classification/Similarities and Differences.**	Explore the natural world around them, making observations and drawing pictures of animals and plants; (ELG) Know some similarities and differences between the		**Living Things and their Habitats** • 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, (Wicksteed Park) and wider	**Living things and their habitats (Y6)** • Identify the characteristics of different types of animals. • Describe how living things are classified into broad groups according to common observable characteristics

	natural world around them.		environment, Sywell Park, including woodland, grassland and a pond.)	and based on similarities and differences, including microorganisms, plants and animals by grouping organisms found in the local habitat. • To understand the Linaean system for classification.
Living Things and their Habitats. (Biology) **Food Chains**		**Animals, including humans (Y2)** • Find out about and describe the basic needs of animals, including humans, for survival. (water, food and air) **Living things and their habitats (hot habitats)** • Describe how animals obtain their food from plants and other animals, using the idea	**Living Things and their Habitats** • Construct and interpret a variety of food chains, identifying producers, consumers, predators and prey, in parkland, wooded areas and ponds.	

		of a simple food chain, and identify and name different sources of food. • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. • To use simple food chains to describe the relationship between animals and plants.	• Understand food chains and the role of different plants and animals within them, in parkland, wooded areas and ponds.	
Living Things and their Habitats. (Biology) **Reproduction and Life Cycles**	Understand the key features of the life cycle of a plant and an animal (3-4). (Butterfly)	**Animals including Humans (Y2)** • Life cycle of animal e.g. frog. • Life cycle of a plant- e.g. oak, apple, sycamore or Silver Birch tree. • To identify the behaviours of animals (life-cycles) during Spring, Frog life cycle)	**Living Things and their Habitats** • Observe plant/tree life cycles in the park.	**Living Things – Life cycles of mammals and plants** • The life process of reproduction in some plants and animals by exploring sexual reproduction in plants. • The life process of reproduction in some plants

				and animals by exploring asexual reproduction in plants. • The life cycle of a mammal by exploring the life cycles of mammals in different habitats. • The life process of reproduction in some plants and animals by describing sexual reproduction in mammals. • The life process of reproduction in some plants and animals by exploring Jane Goodall's work with chimpanzees. • Describe the differences in the

				life cycles of an amphibian, (newt) and an insect (dragonfly) by exploring complete and incomplete metamorphosis. • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird by describing and Compare different life cycles, including birds.
Living Things and their Habitats. (Biology) **Micro-organisms**				**Living things and their habitats (Y6)** • To describe and investigate helpful and harmful micro-organisms.

Living Things and their Habitats. (Biology) **Environmental Change**	• Begin to understand the need to respect and care for the natural environment and all living things (3-4).		**Living Things and their Habitats** • Recognise that environments can change and that this can sometimes pose dangers to living things by identifying changes and dangers in the local habitat. • Know the positives of nature reserves, parks, ponds and the negatives of development, traffic and litter.	
Living Things and their Habitats. (Biology) **Seasonal Change**	• Understand the effect of the changing seasons around them. (R). • Understand some	**Seasons - Autumn** • There are 4 seasons. Winter, Spring, Summer and Autumn. **Seasons – Summer** • Explore local environment. Describe the changes, e.g. colours changing etc, changing weather conditions.	• Understand the change in plant stages over the year and the changes in the environment.	

	important processes and changes in the natural world around them, including the seasons and changing states of matter (ELG) • Understand	• Identify and name a variety of deciduous and evergreen trees. (Plants Y1) • To observe signs of Autumn/Winter/Spring/Summer • To compare and observe patterns of weather during each season. • To understand how animals source their food during Autumn. (e.g. squirrels/hedgehogs hibernation) • Seasonal patterns - changes in the length of a day. The length of the day is shorter in winter and longer in summer.		
Investigate Living Things/Plants **Plant Variety**	Explore the natural world around them. (R) Say what they see, hear and feel when outside. (R).	**Plants** • Identify common plants and trees in the garden and in the wild. • Identify deciduous and evergreen trees.	**Plants** • Look at a range of plants and know that some are flowering, (including grasses) and some are non-flowering.	

	Explore the natural world around them, making observations and drawing pictures of animals and plants; (ELG) 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; (ELG)			

Investigate Living Things/Plants **Structure/Function**	Identify the main parts of a flowering plant eg flower, stem, root and leaf.	**Plants** • Identify the main parts of a flowering plant and tree.	**Plants** • Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers by labelling the parts of a plant. • Know how water is transported in plants. Know plants can make food. • Know the parts that flowers play in the life cycle of flowering plants, including pollination	**Living Things – Life cycles of mammals and plants** • Identify and describe the functions of different parts of flowering plants: stigma, style, ovary, ovules,
Investigate Living Things/Plants **Growth**	• Plant seeds and care for growing	**Plants** • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. (Seed germination.)	**Plants** • Understand that plants need air, light, water, nutrients from soil and room to	

	plants (3-4).		grow. (Plant growth) • Know that plants vary in their needs.	
Investigate Living Things/Plants **Life Cycles**	• **Down the Bottom of the Garden** • Understand the key features of the life cycle of a plant and an animal (3-4). (Butterfly) •	**Plants** • Recap lifecycle of a tree • Observe and describe how seeds and bulbs grow into mature plants. •	**Plants** • Know the parts that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.	**Living Things – Life cycles of mammals and plants** • The life process of reproduction in some plants by exploring sexual reproduction in plants. • The life process of reproduction in some plants by exploring asexual reproduction in plants.
Investigate Living Things/Plants **Care and Respect**	• Begin to understand the need to respect and care for the		**Plants** • Care and respect plants and living things.	

	natural environment and all living things (3-4). •			