Euxton CE Primary School

Key Knowledge & Progression Document for Science

- Boxes which are shaded denote years when the unit is not taught;
- Boxes which are shaded and have writing in italics denote knowledge which provides a foundation for subsequent years. This may be derived from other units;
- Text which is highlighted shows cross-curricular links with the topics which are commonly taught during the same school year, and sometimes concurrently with the Science topic.

KEY KNOWLEDGE: BIOLOGY				
	Animals including humans	**Plants**	**Living things and their habitats**	**Evolution and inheritance**
EYFS	Explore our five senses.	Experiment with growing plants. Share and enhance knowledge of seeds, plants, fruits and vegetables. Identify different types of seeds, understand germination. Identify stages of the life cycle of a seed. Name the parts of common plants.	Investigate mini-beasts and animal life-cycles e.g., life cycle of caterpillars and frogs. Understand the needs of small animals in order to survive in winter.	*Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.*
Year 1	Spot and name a variety of common animals that are carnivores, herbivores and omnivores, recognising what they eat. Describe and compare the structure of a variety of common animals. Name, draw and label the basic parts of the human body and say which part of the body is to do with each sense.	Name some common wild and garden plants, including deciduous and evergreen trees. Name and describe the basic structure of a variety of common flowering plants, including trees. Year 1 DT: preparing fruits and vegetables		
Year 2	Explain that animals, including humans, have babies which grow into adults. Explain the needs of animals, including humans, for survival. Explain the importance of exercise, eating healthily and keeping clean.	Explain how seeds and bulbs grow into plants. Describe how plants need water, light and a suitable temperature to grow and stay healthy. Year 2 DT: preparing fruits & vegetables	Explain the differences between things that are living, dead and things have never been alive. Explain that most living things live in habitats which suit them and depend on each other. Name some plants and animals in their habitats including micro-habitats. Explain how animals get their food from plants and other animals using a simple food chain.	*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. (Y2 - Living things and their habitats)* *Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans)*
Year 3	Identify that animals, including humans, need the right types and amount of nutrition, and that they get nutrition from what they eat. Eexplain why humans and some other animals have skeletons and muscles. Year 3 RE: Harvest around the world DT: Cooking and nutrition PSHE: Is it safe to eat or drink?	Explain what different parts of flowering plants do. Explore requirements of plants for life and growth and how they vary from plant to plant. Investigate the way in which water is transported within plants. Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. DT: show the life-cycle of a plant using CAD		*Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 - Rocks)* *Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)*
Year 4	Explain some parts of the digestive system in humans. Explain the different types of teeth in humans and what they do. Describe and explain a variety of food chains, naming producers, predators and prey. DT: cooking and nutrition; Anglo-Saxon stew		Show that living things can be grouped together in various ways. Explore and use classification keys to help group, identify and name a variety of living things. Explain that environments can change and that his sometimes means that living thigs are put in danger.	*Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats)*
Year 5	Describe the changes as humans develop to old age. PSHE: Growing and changing (puberty) & Keeping/Staying Healthy: smoking	Describe how some plants reproduce (see Living things and their habitats). Year 5 Geography: Amazing Alaska & Fun Florida biome study.	Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. Describe how some animals and plants reproduce.	
Year 6	Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. Recognise the impact of diet, exercise, drugs and lifestyle on the way the body functions. Describe the ways in which nutrients and water are transported within animals, including humans.		Describe how plants, animals and micro-organisms are classified into broad groups according to common observable characteristics and based on similarities and differences. Give reasons for classifying plants and animals based on specific characteristics.	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.
Key Stage 3	*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.* *The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases.* *The effects of recreational drugs (including substance misuse) on behaviour, health and life processes.* *The structure and functions of the gas exchange system in humans, including adaptations to function.* *The mechanism of breathing to move air in and out of the lungs.* *The impact of exercise, asthma and smoking on the human gas exchange system*	*Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms.*	*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.* *Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms.* *Differences between species.*	*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 species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection.* *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.*

KEY KNOWLEDGE: CHEMISTRY		
	Materials	**Rocks**
EYFS	Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.	Investigate fossils travel back in time to imagine what life was like for dinosaurs.
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, metal, water, and rock. Describe the simple physical properties of a variety of everyday materials. Compare and group together a variety of everyday materials on the basis of their simple physical properties. Year 2 DT: textiles: animal finger puppets. Joining fabric in different ways. Year 2 DT: making free standing structures. Understanding how to make them stronger, stiffer and more stable.	*Distinguish between an object and the material from which it is made. (Y1 - Everyday materials)* *Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials)* *Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials)* *Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials)*
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.	*Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials)*
Year 3	*Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. (Y3 - Rocks)* *Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 - Rocks)* *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. (Y3 - Forces and magnets)*	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. Study the work of Mary Anning. Geography: Earth's structure and the structure of volcanoes
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(Y6 Geography: Raging Rivers). Recognise some common conductors and insulators, and associate metals with being good conductors. (Y4 - Electricity)	
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. Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. Demonstrate that dissolving, mixing and changes of state are reversible changes. Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda. DT: Textiles; Christmas Stockings	
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. (Y6 - Evolution and inheritance) Year 6 Geography: Magnificent Mountains: understanding of the formation of fold mountains.
Key Stage 3	*Chemical reactions as the rearrangement of atoms.* *Representing chemical reactions using formulae and using equations.* *Combustion, thermal decomposition, oxidation and displacement reactions.* *Defining acids and alkalis in terms of neutralisation reactions.* *The pH scale for measuring acidity/alkalinity; and indicators.*	*The composition of the Earth.* *The structure of the Earth.* *The rock cycle and the formation of igneous, sedimentary and metamorphic rocks.*

KEY KNOWLEDGE: PHYSICS (1)

	Light	Sound	Electricity
EYFS	Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes. Diwali: exploring and understanding the festival of Light.		
Year 1	*Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 Animals, including humans)* *Describe the simple physical properties of a variety of everyday materials. (Y1 - Materials)*	*Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 -Animals, including humans)*	
Year 2			
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 an opaque object. Find patterns in the way that the size of shadows changes.		
Year 4	RE: Christmas: Exploring the symbolism of light	Identify how sounds are made, associating some of them with something vibrating. Recognise that vibrations from sounds 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. Music: exploring different (wind) instruments and techniques for playing.	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. DT: electrical systems: building circuits and switches to make a lamp
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. (Y5 - Properties and changes of materials)*		
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.		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.
Key Stage 3	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.	Waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel –superposition. Frequencies of sound waves, measured in Hertz (Hz); echoes, reflection and absorption of sound. Sound needs a medium to travel, the speed of sound in air, in water, in solids. Sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal. Auditory range of humans and animals. Pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound. Waves transferring information for conversion to electrical signals by microphone.	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). Static electricity.

KEY KNOWLEDGE: PHYSICS (2)			
	Seasonal Changes	**Forces**	**Earth & Space**
EYFS	Investigate seasons, including the season of winter and life in the North and South Poles. Understand the difference between light and dark. Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.		
Year 1	Observe changes across the four seasons. Observe and describe weather associated with the seasons and how day length varies. Geography: learning about weather patterns across the world and the UK's 4 seasons.		
Year 2		Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 -Uses of everyday materials)	
Year 3	*Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 - Light)*	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 4			
Year 5	*Use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky. (Y5 - Earth and space)*	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.	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. English: conducting research and writing about Space.
Year 6			
Key Stage 3	*The seasons and the Earth's tilt, day length at different times of year, in different hemispheres*	*Magnetic fields by plotting with compass, representation by field lines.* *Earth's magnetism, compass and navigation.* *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.*	*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.*