Science UKS2 Curriculum Intention

Working scientifically (Year 5 and 6):

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

	TOPIC	National Curriculum	Knowledge *What do we want the children to know?* *Personalised to our topics/local area*	Vocabulary	Resources:
Year 5	**Living things and their habitats**	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	As part of their life cycle, plants and animals reproduce. Most animals reproduce sexually. This involves two parents where the sperm from the male fertilises the female egg. Animals, including humans, have offspring which grow into adults. In humans and some animals, these offspring will be born live, such as babies or kittens, and then grow into adults. In other animals, such as chickens or snakes, there may be eggs laid that hatch to young which then grow to adults. Some young undergo a further change before becoming adults e.g. caterpillars to butterflies. This is called a metamorphosis. Plants reproduce both sexually and asexually. Bulbs, tubers, runners and plantlets are examples of asexual plant reproduction which involves only one parent. Gardeners may force plants to reproduce asexually by taking cuttings. Sexual reproduction occurs through pollination, usually involving wind or insects.	Life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis, asexual, plantlets, runners, bulbs, cuttings	https://www.planassessment.com/living-things-y5

	Animals including humans	Describe the changes as humans develop to old age.	When babies are young, they grow rapidly. They are very dependent on their parents. As they develop, they learn many skills. At puberty, a child's body changes and develops primary and secondary sexual characteristics. This enables the adult to reproduce.	Puberty – the vocabulary to describe sexual characteristics	https://www.planassessment.com/animals-including-humans-y5
	Properties and changes in materials	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.	Materials have different uses depending on their properties and state (liquid, solid, gas). Properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets. Some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment. Mixtures can be separated by filtering, sieving and evaporation. Some changes to materials such as dissolving, mixing and changes of state are reversible, but some changes such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials and these are not reversible.	Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material	https://www.planassessment.com/properties-changes-of-materials-y5
	Earth and Space	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.	The Sun is a star. It is at the centre of our solar system. There are 8 planets (can choose to name them, but not essential). These travel around the Sun in fixed orbits. Earth takes 365¼ days to complete its orbit around the Sun. The Earth rotates (spins) on its axis every 24 hours. As Earth rotates half faces the Sun (day) and half is facing away from the Sun (night). As the Earth rotates, the Sun appears to move across the sky. The Moon orbits the Earth. It takes about 28 days to complete its orbit. The Sun, Earth and Moon are approximately spherical.	Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), spherical, solar system, rotates, star, orbit, planets	https://www.planassessment.com/earth-and-space-y5

	Forces	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.	A force causes an object to start moving, stop moving, speed up, slow down or change direction. Gravity is a force that acts at a distance. Everything is pulled to the Earth by gravity. This causes unsupported objects to fall. Air resistance, water resistance and friction are contact forces that act between moving surfaces. The object may be moving through the air or water, or the air and water may be moving over a stationary object. A mechanism is a device that allows a small force to be increased to a larger force. The pay back is that it requires a greater movement. The small force moves a long distance and the resulting large force moves a small distance, e.g. a crowbar or bottle top remover. Pulleys, levers and gears are all mechanisms, also known as simple machines.	Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears	https://www.planassessment.com/forces-y5
Year 6	**Living things and their habitats**	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.	Living things can be formally grouped according to characteristics. Plants and animals are two main groups but there are other livings things that do not fit into these groups e.g. micro-organisms such as bacteria and yeast, and toadstools and mushrooms. Plants can make their own food whereas animals cannot. Animals can be divided into two main groups: those that have backbones (vertebrates); and those that do not (invertebrates). Vertebrates can be divided into five small groups: fish; amphibians; reptiles; birds; and mammals. Each group has common characteristics. Invertebrates can be divided into a number of groups, including insects, spiders, snails and worms. Plants can be divided broadly into two main groups: flowering plants; and non-flowering plants.	Vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering, non-flowering	https://www.planassessment.com/living-things-y6

	Animals including humans	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 their bodies function. Describe the ways in which nutrients and water are transported within animals, including humans.	The heart pumps blood in the blood vessels around to the lungs. Oxygen goes into the blood and carbon dioxide is removed. The blood goes back to the heart and is then pumped around the body. Nutrients, water and oxygen are transported in the blood to the muscles and other parts of the body where they are needed. As they are used, they produce carbon dioxide and other waste products. Carbon dioxide is carried by the blood back to the heart and then the cycle starts again as it is transported back to the lungs to be removed from the body. This is the human circulatory system. Diet, exercise, drugs and lifestyle have an impact on the way our bodies function. They can affect how well out heart and lungs work, how likely we are to suffer from conditions such as diabetes, how clearly we think, and generally how fit and well we feel. Some conditions are caused by deficiencies in our diet e.g. lack of vitamins. This content is also included in PSHE. The new statutory requirements for relationships and health education can be found below:	Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs, lifestyle	https://www.planassessment.com/animals-including-humans-y6
	Evolution and inheritance	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.	All living things have offspring of the same kind, as features in the offspring are inherited from the parents. Due to sexual reproduction, the offspring are not identical to their parents and vary from each other. Plants and animals have characteristics that make them suited (adapted) to their environment. If the environment changes rapidly, some variations of a species may not suit the new environment and will die. If the environment changes slowly, animals and plants with variations that are best suited survive in greater numbers to reproduce and pass their characteristics on to their young. Over time, these inherited characteristics become more dominant within the population. Over a very long period of time, these characteristics may be so different to how they were originally that a new species is created. This is evolution. Fossils give us evidence of what lived on the Earth millions of year ago and provide evidence to support the theory of	Offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils	https://www.planassessment.com/evolution-and-inheritance-y6

			evolution. More recently, scientists such as Darwin and Wallace observed how living things adapt to different environments to become distinct varieties with their own characteristics.		
	Light	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.	Light appears to travel in straight lines, and we see objects when light from them goes into our eyes. The light may come directly from light sources, but for other objects some light must be reflected from the object into our eyes for the object to be seen. Objects that block light (are not fully transparent) will cause shadows. Because light travels in straight lines the shape of the shadow will be the same as the outline shape of the object.	As for Year 3 - Light, plus straight lines, light rays	https://www.planassessment.com/light-y6
	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. Use recognised symbols when representing a simple circuit in a diagram.	Adding more cells to a complete circuit will make a bulb brighter, a motor spin faster or a buzzer make a louder sound. If you use a battery with a higher voltage, the same thing happens. Adding more bulbs to a circuit will make each bulb less bright. Using more motors or buzzers, each motor will spin more slowly and each buzzer will be quieter. Turning a switch off (open) breaks a circuit so the circuit is not complete and electricity cannot flow. Any bulbs, motors or buzzers will then turn off as well. You can use recognised circuit symbols to draw simple circuit diagrams.	Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage	https://www.planassessment.com/electricity-y6

Upper Key Stage Two Enquiry Map

	Observe changes over time	Notice patterns	Grouping and classifying	Fair and comparative tests	Secondary sources
Living things and their habitats	Grow and observe plants that reproduce asexually Plant bulbs and harvest to see how they multiply Time lapse videos on animals	Size of animal vs life expectancy/gestation period Making comparisons between two species	Taking cuttings		Research the life cycle of an animal/gestation periods Pollination
Animals, including humans					Research enquiry by asking an expert e.g. school nurse
Properties and changes in materials	Explore adding a range of solids to water and other liquids e.g. cooking oil, as appropriate. Explore a range of non-reversible changes		Separate mixtures by sieving, filtering and evaporation, choosing the most suitable method and equipment for each mixture.	Investigate the properties of different materials in order to recommend materials for particular functions depending on these properties Investigate rates of dissolving Non-reversible changes e.g. What affects the rate of rusting? What affects the amount of gas produced?	Research new materials produced by chemists e.g. Spencer Silver (glue of sticky notes) and Ruth Benerito (wrinkle free cotton).

Upper Key Stage Two

	Observe changes over time	Notice patterns	Grouping and classifying	Fair and comparative tests	Secondary sources
Earth and Space	Make first-hand observations of how shadows caused by the Sun change through the day. Make a sundial				Use secondary sources to help create a model e.g. role play or using balls to show the movement of the Earth around the Sun and the Moon around the Earth. Use secondary sources to help make a model to show why day and night occur. Research time zones.
Forces	Observe the effect of a brake on a bicycle Throwing a rugby ball compared to a javellin	Forcemeters Patterns with friction - rough/smooth Boat shapes Levers and pulleys	Grouping items that lift and do not, those that have gears and do not	Marble run Friction investigation: design own car ramp/trainers on surfaces Parachute/heelicopter/paper aeroplane Boat shapes	
Living things and their habitats		Use first-hand observation to identify characteristics shared by the animals in a group	Use information about the characteristics of an unknown animal or plant to assign it to a group Classify plants and animals, presenting this in a range of ways e.g. Venn diagrams, Carroll diagrams and keys		Use secondary sources to learn about the formal classification system devised by Carl Linnaeus and why it is important. Use secondary sources to research the characteristics of animals that belong to a group
Animals, including humans	observation over time - how long does it take my pulse rate to return to my resting pulse rate (recovery rate)	pattern seeking – exploring which groups of people may have higher or lower resting pulse rates pattern seeking – exploring recovery rate for different groups of people.		fair test – effect of different activities on my pulse rate	Create a role play model for the circulatory system. Research the negative effects of drugs (e.g. tobacco) and the benefits of a healthy diet and regular exercise by asking an expert or using carefully selected secondary sources

Upper Key Stage Two

	Observe changes over time	Notice patterns	Grouping and classifying	Fair and comparative tests	Secondary sources
Evolution and inheritance		Make observations of fossils to identify living things that lived on Earth millions of years ago.	Use models to demonstrate evolution e.g. 'Darwin's finches' bird beak activity		Use secondary sources to find out about how the population of peppered moths changed during the industrial revolution Research the work of Mary Anning and how this provided evidence of evolution.
Light		Explore the uses of the behaviour of light, reflection and shadows, such as in periscope design, rear view mirrors and shadow puppets.		Explore different ways to demonstrate that light travels in straight lines e.g. shining a torch down a bent and straight hose pipe, shining a torch through different shaped holes in card.	
Electricity		Make circuits to solve particular problems, such as a quiet and a loud burglar alarm.		Carry out fair tests exploring changes in circuits Make circuits that can be controlled as part of a DT project	

Other resources:

- **Assessment materials** - https://pstt.org.uk/resources/curriculum-materials/assessment
- **CIEC Interactive planning tool (supportive template for planning investigations)** https://www.york.ac.uk/ciec/resources/primary/skills-for-science/
- **CIEC: how stories can support science teaching** http://www.ciec.org.uk/resources/pencils-poems-and-princesses.html http://www.ciec.org.uk/primary/new-for-2020-2021.html
- **Role badges:** https://www.york.ac.uk/media/ciec/skillsforscience/rolebadges/role-badges.pdf
- **Primary Science Teaching Trust (PSTT) resources** - https://pstt.org.uk/resources/curriculum-materials
- **Scientific vocabulary from STEM**- https://www.stem.org.uk/elibrary/resource/34636
- **4-7 years Investigation posters** - https://www.primarilyscience.co.uk/resource/7-11-years-investigation-posters-a4/
- **BBC Terrific Science** - https://www.bbc.co.uk/teach/terrific-scientific
- **Reach out CPD (FREE)**- https://www.reachoutcpd.com/
- **Explorify -** https://explorify.uk/en/activities