

Year 5 and 6 Science

Questions to Develop Children's Spirituality in Science:	Do you believe there is creator of the earth? Do you believe in evolution, that humans came from monkeys and we all developed from fish? Does the theory of evolution mean you are just a monkey? Are you just a pile of atoms? In what ways are you like your parents (made in their image)? What is it like to be made in the image of God? Why is it that no two people on the earth are exactly the same- not even twins? Is your behaviour learnt or inbuilt- are we naturally selfish? When you look around at the wonders of the natural world do you think these things were created by accident or by design?
Development of the child:	Questioning, wonder, critical mind, reasoning and awe.

Year 5 and 6 Science

<p>Topic: Properties of Materials and reversible and irreversible changes Subject: Science</p>	<p>Prior Knowledge/Links: Children should already know: The foundation for this unit is the knowledge and understanding from the 'states of matter' unit in Y3/4.</p>
<p>National Curriculum Objectives</p> <p>Compare and group together everyday materials based on evidence from comparative and fair tests, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets</p> <p>Understand that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</p> <p>Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating</p> <p>Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic</p> <p>Demonstrate that dissolving, mixing and changes of state are reversible changes</p>	<p>Key Knowledge and Vocabulary</p> <p>This unit can be taught over the Autumn term (in both halves). It is recommended that children be introduced to some field work to observe life cycle changes. I have included that document at the end of these lists. We have the opportunity to use our allotments and forest school area to support this learning.</p> <ul style="list-style-type: none"> • To compare materials according to their properties. • To understand the thermal conducting or insulating properties of materials through investigation of different materials. • To know which conductors make a bulb shine brightest. • To know that some materials will dissolve in liquid to form a solution. • To be able to group materials based on their properties such as solubility or conductance. • To demonstrate that dissolving, mixing and changes of state are reversible changes. • To be able to accurately use the vocabulary that describes changes of state – melting, boiling, evaporating, condensing, freezing and to be able to apply it to a material (the obvious example would be to describe all the changes of state of water). • To know that some mixtures can be separated by filtering, sieving and evaporating. • To know that some changes result in the formation of new materials and that this kind of change is usually irreversible. • To be able to identify some irreversible changes, such as chemical changes, cooking and burning. They should understand that as well as the visible changes occurring, there are often other materials involved such as the formation of gases – look for bubbles, vapour, flames etc.

Year 5 and 6 Science

--	--

<p>Topic: Living Things and their Habitats Subject: Science</p>	<p>Prior Knowledge/Links: Children should already know: Parts of a flower LKS2</p>
<p>National Curriculum Objectives</p>	<p>Key Knowledge and Vocabulary</p>
<p>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.</p>	<ul style="list-style-type: none"> • This unit is taught during the Amazon Adventure unit and although the main focus of learning is geographical – rainforest, river, deforestation etc., there are many opportunities to study the animals of South America. Areas of focus can include interdependence in ecosystems, adaptations for the rainforest, as well as learning outlined below related to life cycles. • Children develop their understanding of knowing the parts of a flower. Learn about flowers that are pollinated by wind or by insect. Link the parts of the flower to its function. Learn about the process of fertilisation. • Take cuttings from a geranium plant – any cuttings that develop roots over next few weeks can be planted. Excellent way for children to comprehend that the new plants are genetically identical – rather than offspring that share DNA of male and female ‘parents’, these are essentially genetic ‘copies’ of the plant. • Compare advantages and disadvantages of sexual and asexual reproduction in plants (links to learning about evolution and adaptation). • Learn about reproduction in different mammals – what they have in common. Watch film showing human egg fertilisation and cell division. Children should be able to order the stages of reproduction. • Learn about Jane Goodall’s work with chimpanzees in Tanzania. • Children learn about animals that undergo metamorphosis. They compare the life-cycles of an amphibian and an insect and discuss differences and similarities. Opportunity to observe tadpoles or caterpillars in school. • Learn about the life cycle of birds and name the parts of an egg. <p>Vocabulary: sexual reproduction, asexual reproduction, gamete, cell, pollen, ovule, fusion, fertilisation, pollination, stigma, style, ovary, filament, penis, vagina, pregnancy, montreme, marsupial, endangered, extinct, metamorphosis, amphibian, larvae, pupa, nymph, albumen, yolk.</p>

Year 5 and 6 Science

<p>Topic: Animals, including humans Subject: Science</p>	<p>Prior Knowledge/Links: Children should already know:</p>
<p>National Curriculum Objectives</p>	<p>Key Knowledge and Vocabulary</p>
<p>Describe the changes as humans develop to old age.</p> <p>Pupils should draw a timeline to indicate stages in the growth and dev of humans.</p> <p>Research the gestation periods of other animals and compare them with humans.</p> <p>Find out and record the length and mass of a baby as it grows</p>	<ul style="list-style-type: none"> • From the outset of this unit, there is a crossover with the ‘growing up’ lessons in PSHE lessons. These PSHE lessons will commence in week 1 or 2 of this topic. • To develop their understanding that organisms reproduce sexually or asexually. There is the opportunity to recap on reproduction in plants from the previous unit. • To understand the development of a human embryo and foetus – the children can view an animation of an embryo in utero. • Place six stages of human development correctly on a timeline – they will learn the names of the stages and be able to describe key changes during each stage. • To gain an understanding of how babies grow in their first year of life – look at data for height and weight. This is an opportunity to discuss data and how to represent it (difference between continuous and discrete data). Show examples of line graphs showing ‘changes over time’, relate to data they may have recorded in prior learning, e.g. temperature of a liquid cooling over time. This is also an opportunity to plot two sets of data on the same graph, e.g. boys and girls. Cross-curricular opportunity – graph using Excel, Numbers etc. • To learn about puberty in humans – the science aspect focuses on physical changes to the body. Discuss changes for girls and boys, including an understanding of menstruation. Include discussion of related terminology so that children can understand the scientific terms and make links to more commonly used language. • To learn about the changes to humans in old age. Facilitate lots of discussion to address any misconceptions children might have. They will research ways to stay healthy in old age. Consider having a visitor to discuss their experiences and feelings about old age. • Children compare foetuses from different types of animals. This can be the basis for asking pertinent questions and suggesting reasons for similarities and differences. • Look at animals of many types. Excellent opportunities for recapping on classification. Discuss length of time of gestation of these animals and justify ideas with reasoning. Look at actual data and compare with initial ideas. Agree upon factors that impact length of gestation periods.

Year 5 and 6 Science

	<ul style="list-style-type: none"> • Study data showing the gestation period and life expectancy of animals. This is another opportunity to represent data – this time as a bar chart (discrete data). <p>Vocabulary: egg, sperm, foetus, gestation period, adolescence, infancy, adulthood, prenatal, puberty, pubic hair, genitals, menstruation, period, old age, life expectancy, causal relationship, correlation, findings, discrete data, continuous data, bar chart, line graph.</p>
<p>Topic: Evolution and Inheritance Subject: Science</p>	<p>Prior Knowledge/Links: Children should already know:</p>
<p>National Curriculum Objectives</p>	<p>Key Knowledge and Vocabulary</p>
<p>Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.</p> <p>Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.</p> <p>Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.</p>	<ul style="list-style-type: none"> • Identify inherited characteristics that are passed on to offspring. Develop understanding of how this leads to variation. Look at characteristics that are learned rather than inherited. • Be introduced to the cell structure of living things and the DNA that is the code that provides organisms with the information they need to function in certain ways. • Learn that adaptation usually comes about from mutations in the DNA code – and how this leads to the development of adaptive traits. • Look at arctic animals and how their features and behaviours have enabled them to live in that habitat. Research some of the arctic species. • Learn about invasive species of plants and animals and the effect they can have on native species. Give local examples. Design an invasive species. • Learn about the theory of evolutionary change and the scientists who proposed it and popularised it. Activities can be used to show how adaptations can make species more successful at eating different foods – ‘the bird beak buffet’ and a survival game that includes adaptations, random mutations, food sources, reproduction etc. can be used to model how different animal populations increase or decrease over time. • Research an animal that has become extinct, such as the dodo. Sequence the events that affected its success, decline and extinction. • Examine fossil evidence that can be used to support the theory of evolution. • Identify adaptive traits in humans as a species. Describe the known stages of human evolution. Understand why the concept of human evolution was a controversial idea. • Understand that some living things have acquired more adaptive traits than others. Understand that adaptations can result in both advantages and disadvantages. Learn that humans have created new varieties of living things through selective breeding. Compare and contrast dog breeds and link traits to the dog’s potential use as a pet or working dog.

Year 5 and 6 Science

	Vocabulary: inheritance, parent, offspring, characteristics, variation, adaptation, environment, habitat, DNA, genes, adaptive traits, mutation, replication, accidental, theory of evolution, fossil record, common ancestor, apes, mammals, homo sapiens, family, genus, species, taxonomy, human intervention, selective breeding, modification.
--	---

Topic: Light Subject: Science	Prior Knowledge/Links: Children should already know: LKS2 – light unit
National Curriculum Objectives	Key Knowledge and Vocabulary
<p>Recognise that light appears to travel in straight lines.</p> <p>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.</p> <p>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.</p> <p>Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.</p>	<ul style="list-style-type: none"> • To understand that light is a type of energy and that it comes from light sources. • To know that light waves travel in straight lines. To know that although light is a wave, it does not need a medium to travel through and that it can travel through space. • To understand the science behind how we see with our eyes – that light travels from a light source and is reflected off objects, and that it is this reflected light entering our eyes that enables our brain to interpret the images and colour. • To understand the basics of how we see colour – that objects ‘absorb’ certain wavelengths of colour and what we see is the other wavelengths reflected so that we perceive colour. • To know that ‘white’ light can be separated into the colours of the rainbow and that this ‘rainbow effect’ can be achieved by shining light through a prism. • To understand how mirrors work and to be able to use combinations of mirrors to see around corners or obstacles. • To understand the law of reflection and to measure the angle of incidence and the angle of reflection. • To know how shadows are formed and how an object’s shadow can be made to appear larger or smaller. <p>Vocabulary: light, light source, wave, particle of energy, wavelength, reflect, absorb, retina, optic nerve, lens, incident ray, reflected ray, inverted image, visible spectrum, prism, shadow, transparent, translucent, opaque.</p>

Year 5 and 6 Science

<p>Topic: Animals including humans – Exercise, Health & the Circulatory System</p> <p>Subject: Science</p>	<p>Prior Knowledge/Links: Children should already know:</p> <p>I can either push everything back one half-term, which is probably doable, or adapt this unit to be about the life cycle of humans – miss out any plant stuff. Fit in the growing up stuff here – changes during puberty. This would be the only Covid-related rejig so far, so that Y6 get the growing up talks in Spring 1st. Mentioned at governors – seems like a plan.</p>
<p>National Curriculum Objectives</p> <p>Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.</p> <p>Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.</p> <p>Describe the ways in which nutrients and water are transported within animals, including humans.</p>	<p>Key Knowledge and Vocabulary</p> <ul style="list-style-type: none"> • To understand that the circulatory system consists of the heart, arteries, veins and capillaries, and its function is to pump oxygenated blood around the body. • To understand that the circulatory system works together with the respiratory system. Oxygen breathed into the lungs in the respiratory system moves into blood vessels and is then that oxygen-rich blood is circulated around the body. • To understand some of the biology of the heart – that deoxygenated blood enters the heart through two veins and the heart pumps that blood through a valve to the lungs. Oxygenated blood flows into the heart through a vein and then the heart pumps that through the aorta (the start of the artery system) to the rest of the body. • To learn the function of white and red blood cells. • To know that besides oxygen, your circulatory system also carries nutrients from food around the body. Food is broken down during digestion and as the food moves through the small intestine, the nutrients enter the bloodstream. • To recognise the effect of diet and exercise on the way their bodies function by describing the effects of a healthy lifestyle. • Learn how to take accurate pulse measurements. • To investigate some of the effects of exercise on their bodies. • To learn what we mean by the terms ‘chemicals’, ‘substances’, ‘medicine’ and ‘drugs’. • To recognise the impact of drugs on body functions and the harmful effects that they can have.

Year 5 and 6 Science

	<p>Vocabulary: circulatory system, respiratory system, digestive system, artery, vein, capillary, oxygenated blood, deoxygenated blood, pump, valve, aorta, nutrient, white blood cell, red blood cell, chemicals, substances, medicine, drugs, controlled substance, alcohol.</p>
--	--

<p>Topic: Classification Subject: Science</p>	<p>Prior Knowledge/Links: Children should already know: This unit has many links to the Autumn term work on evolution and adaptation. They will have seen evolutionary diagrams that show branches with taxonomic vocabulary/concepts and they will have done some activities looking at order, class, genus, species etc. They know that living things in the same order share DNA, for example.</p>
<p>National Curriculum Objectives</p>	<p>Key Knowledge and Vocabulary</p>
<p>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</p> <p>Give reasons for classifying plants and animals based on specific characteristics.</p>	<ul style="list-style-type: none"> • 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. • Understand that living things can be grouped into micro-organisms, plants and animals. • Learn about the work of Carl Linnaeus and his taxonomic system • Understand that vertebrates can be grouped as fish, amphibians, reptiles, birds and mammals. • Understand that invertebrates' groupings include insects, arachnids, crustaceans, molluscs, and annelids. • Learn some of the common characteristics of these groupings. • Plants can be grouped as flowering plants (incl. trees and grasses) and non-flowering plants (such as ferns and mosses). • Understand that micro-organisms can be helpful or harmful. • Learn some of the characteristics of types of micro-organisms – bacteria, archaea, fungi, algae, protozoa and viruses. <p>Classify, sort, group, Linnaen system of classification, taxonomy, taxonomic rank, order, family, genus, species, vertebrates, invertebrates, fish, amphibians, reptiles, birds, mammals, insects, arachnids, crustaceans, molluscs, annelids, flowering plants, ferns, mosses, micro-organisms, bacteria, fungi, virus.</p>

Year 5 and 6 Science

<p>Topic: Electricity Subject: Science</p>	<p>Prior Knowledge/Links: Children should already know: Electricity topic – Sparks Might Fly delivered in Y3/4</p>
<p>National Curriculum Objectives</p>	<p>Key Knowledge and Vocabulary</p>
<p>Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.</p> <p>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.</p> <p>Use recognised symbols when representing a simple circuit in a diagram.</p>	<ul style="list-style-type: none"> • Understand the importance of the major discoveries in electricity, in the history of science. • Use recognised symbols when representing a simple circuit in a diagram. • 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 and interpret circuit diagrams to construct a variety of more complex circuits predicting whether they will ‘work’. • Be able to construct a circuit that will solve a set challenge (or a series of challenges if the work progresses). • To be able to draw that circuit as an accompanying diagram.

Notes about field journals (referenced in 1st knowledge list above): **Observing and recording a variety of living things in their habitats (AMAZON ADVENTURE theme in Summer 1)**

It is useful to introduce the field journal work from the ‘Amazon Adventure’ theme at the beginning of the school year to allow children to observe life cycle changes in a variety of living things throughout the year (once per month / twice per term would be a guide), for example plants in the vegetable garden or flower border, and animals in the local environment. This provides more time for considering change over a longer period of time than a six/seven week half term and allows for more examples to be experienced. It

Year 5 and 6 Science

supports the NC2014 in encouraging children to understand about the biodiversity of our planet and encouraging children to be 'real' gardeners whilst using the school/local grounds more frequently to support learning. (Discuss the use of herbariums with the Y4 teacher linked to the Y4 'Hunted' theme – this can be continued when observing plant life cycles in Y5). Some suggested opportunities linked to Y5 key learning are provided below;

Year 5 and 6 Science

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p>Observing growth in the school vegetable patch in the early autumn (fruits and seeds produced by the flowers <i>after</i> the flowering stage). Link to whether a plant's life cycle includes death of the plant or a dormant 'over winter' stage.</p>	<p>Research plants growing in the extreme conditions of Antarctica (see 'Amazon Adventure' for more details).</p> <p>What can they find out about the life cycle of holly or mistletoe? (great research opportunity during the run up to Christmas).</p>	<p>Indoor plants – observing spider plants and how they can reproduce using runners.</p> <p>Observing and recording growth from bulbs – recording as a life cycle poster showing each stage.</p> <p>Potato Project registering www.gyop.potato.org.uk</p>	<p>Observing bird box activity via school bird box camera or national initiative such as 'BBC Springwatch' (this may continue in to summer 1).</p> <p>Preparing for Spring...Potato chitting (see Potato Project online re this process).</p>	<p>Potato planting – observing and recording the life cycle.</p> <p>Observing and reporting on new life examples in other classes: Tadpoles/frogs, eggs/chicks, caterpillars/butterflies</p> <p>Observing and recording plant life cycles in school garden and environment:</p> <ul style="list-style-type: none"> • An area of glass allowed to continue growing. • A dandelion life cycle. • A vegetable life cycle grown from seed. • A fruit life cycle grown from seed e.g. strawberries (runners) and tomatoes. 	<p>Continuing to observe and record plant life cycles in school garden and environment:</p> <ul style="list-style-type: none"> • An area of glass allowed to continue growing. • A dandelion life cycle. • A vegetable life cycle grown from seed. • A fruit life cycle grown from seed e.g. strawberries (runners) and tomatoes. <p>Interview a gardener about how to take stem and root cuttings. Experiment with the techniques.</p>