



THE BIG IDEAS OF SCIENCE

Physics

P1: The universe follows unbreakable rules that are all about forces, matter and energy.

P2: Forces are different kinds of pushes and pulls that act on all the matter that is in the universe. Matter is all the stuff, or mass, in the universe.

P3: Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it.

Chemistry

C1: All matter (stuff) in the universe is made up of tiny building blocks.

C2: The arrangement, movement and type of the building blocks of matter and the forces that hold them together or push them apart explain all the properties of matter (e.g. hot/cold, soft/hard, light/heavy, etc.).

C3: Matter can change if the arrangement of these building blocks changes.

Biology

B1: Living things are special collections of matter that make copies of themselves, use energy and grow.

B2: Living things on Earth come in a huge variety of different forms that are all related because they all came from the same starting point 4.5 billion years ago.

B3: The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live.

Earth science

E1: The Earth is one of eight planets that orbit the sun.

E2: The Earth is tilted and spins on its axis leading to day and night, the seasons and the climate.

E3: The Earth is made up of several layers, including a relatively thin rocky surface which is divided into tectonic plates, and the movement of these plates leads to many geologic events (such as earthquakes and volcanoes) and geographical features (such as mountains.)



Year 5 – Ongoing throughout year – Working scientifically	
NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> • 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 • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, and 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 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 	<p><u>Revision</u></p> <p>prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis</p> <p>Know that we can ask questions and answer them by setting up scientific enquiries</p> <p>Know how to make relevant predictions that will be tested in a scientific enquiry</p> <p>Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same</p> <p>Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stopwatches</p> <p>Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw a neat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table</p> <p>Know – with structured guidance - how to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion</p> <p>Know how to precis a scientific enquiry write-up into a brief oral discussion of</p>



<p>arguments.</p>	<p>what was found in a scientific enquiry</p> <p>Know that scientific enquiries can suggest relationships, but that they do <u>not</u> prove whether a prediction is true</p> <p>Know that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which conditions can vary even, and that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry</p> <p>Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts (e.g. effect of changing sunlight on a plant – does this work with other plants / different types of light / etc)</p> <p>Know that they can draw conclusions from the findings of other scientists</p> <p>Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry</p> <p><u>New learning and vocabulary</u></p> <p>line graph, relationship, outlier</p> <p>Know how to choose appropriate variables to test a hypothesis (e.g. plant height as a dependent variable when measuring effect of light on plant growth)</p> <p>Know how to identify conditions that were imperfectly controlled and can</p>
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	<p>explain how these might affect results</p> <p>Know how to accurately use further measuring devices, including digital and analogue scales, measuring cylinders and beakers, recognizing the relative accuracy of each device</p> <p>Know how and when to repeat measurements, how to find an average of a set of measurements and how to recognize and remove outliers from a set of data, justifying the removal as a potential mis-measurement</p> <p>Know how to independently write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion</p> <p>Know how to present brief oral findings from an enquiry, speaking clearly and with confidence and using notes where necessary</p> <p>Know examples of instances where scientific evidence has been used to support or refute ideas or arguments (e.g. fossil records as evidence of natural selection)</p>
<p>Year 5 – Summer Term: Life Cycles</p>	
<p>NC objectives</p>	<p>Key knowledge and vocabulary</p>
<ul style="list-style-type: none"> • 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 the changes as humans develop to old age. 	<p><u>Big idea(s):</u> B1</p> <p><u>Revision</u></p> <p>decay, plant, structure, reproduction, nutrients, reproduction, fish, bird, amphibian, reptile, mammal, fruit, nectar, anther, ovary, ovule, petal, pollen, stigma, style, stamen, function, exchange, dispersal, fertilization,</p>



	<p>insect, vertebrates</p> <p>Living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things.</p> <p>A trout is an example of fish, a frog is an example of an amphibian; a lizard is an example of a reptile; a robin is an example of a bird; a rabbit and a human are examples of a mammal</p> <p>Fish, amphibians, reptiles, birds and mammals are similar in that they have internal skeletons and organs; these are known as vertebrates, which means they are animals that have a backbone</p> <p>Fish are different in having gills so that they can breathe underwater and have scaly skin</p> <p>Amphibians are different in that they begin their lives with gills but then develop lungs and breath on land</p> <p>Reptiles are different in that they breath air and have scaly skin</p> <p>Birds are different to other animals in that they have feathers and wings</p> <p>Mammals are different to other animals in that they have fur/hair and they feed milk to their young</p> <p>Different parts of plants have one or more functions (jobs)</p> <p>Roots collect water and minerals from the soil, and hold the plant firmly in the ground</p> <p>The stem holds up the leaves so that they can gather light to make food</p>
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and holds up the flowers so that they can receive pollen and disperse their fruits; the stem also transports water and minerals from the roots to the other parts of the plant

The leaves make food by trapping light and using its energy to turn carbon dioxide and water into carbohydrates

The function of a flower is reproduction, where flowers of the same kind exchange pollen – made by an anther – in a process called fertilisation, and a structure in the flower's ovary called an ovule becomes a seed; the ovary then becomes a fruit which helps the seed leave the plant in a process called dispersal

New learning and vocabulary

life cycle, life span, embryo, womb, weaned, adolescence, metamorphosis, pupa, larva, chrysalis, caterpillar, tadpole, hatchling, fledgling, insect

Know that the life cycle of a living thing is a series of stages of development starting with a fertilized egg in animals or a seed in many plants

Know that in most mammals (e.g. dogs) a fertilized egg develops in the womb into an embryo and is then born and fed on milk before it is weaned onto the food that is adapted to eat; it then develops to maturity in a period called adolescence after which it can reproduce and the cycle can begin again

Know that in amphibians (e.g. frogs) a fertilized egg develops into an embryo and then hatches into a tadpole; the tadpole develops adult



characteristics, metamorphoses into the adult form after which it can reproduce and the cycle can begin again

Know that in many insects (e.g. butterflies) a fertilized egg develops into wingless feeding form called a larva (caterpillar); the larva feeds then later becomes a pupa (chrysalis) with a protective cocoon; inside this cocoon, the pupa metamorphoses into the adult butterfly after which it can reproduce and the cycle can begin again

Know that in birds (e.g. robins) a fertilized egg hatches in a nest (a hatchling) and is fed by its parents until it is ready to fly (i.e. becomes a fledgling); it then leaves the nest and grows into an adult after which it can reproduce and the cycle can begin again

Know that humans go through stages of development; they begin as fertilized eggs and then develop into embryos before developing into babies; once they are born, these newborn babies become infants (roughly 2 months to 2 years) then into young children (roughly 2-12 years old); children develop into adults during adolescence (roughly 12-16 years old) at which age they become physically capable of reproduction; as adults develop into old age (roughly 55+ years old) they experience changes in their body which require them to move more carefully and rest more frequently

(NB: the changes of adolescence in humans is taught as part of mandatory sex and relationship education; it must be taught with due sensitivity to children's family backgrounds; if in doubt, delay sensitive discussions until the formal teaching of sex and relationship education.)