Year 5/6 Science rolling programme

Working scientifically

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- 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

data pattern finding chart diagram enquiry record present measurement table report scientific conclusion method aim question hypothesis prediction observe observation fair test variable propose prove explore classify gather label equipment quantitative qualitative

	Autumn A (1)	Autumn A (2)	Spring A (1)	Spring A (2)	Summer A (1)	Summer A (2)
Area of study	Forces	Light	Properties and changes of materials	Properties and changes of materials	Evolution and inheritance	Evolution and inheritance
Curriculum objectives	• 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 levels, pulleys and gears allow a smaller force to have a greater effect	• 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	• 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		• 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	
Lines of enquiry	• Why do unsupported objects fall? • What are the effects of friction acting between moving surfaces?	• How are shadows formed? • How can we manipulate shadows? • How do our eyes allow us to see?	• What happens to substances when they are mixed with water? • How can mixtures and solutions be separated? • How are new materials formed and what are irreversible changes? • How do we know if a change is reversible or irreversible?		• What are inherited characteristics and how can they vary? • How are animals and plants adapted to suit their environments? • How can adaptation lead to evolution?	

	• What are the effects of air resistance? • What are the effects of water resistance? • How can simple machines make it easier to move objects? • How do gears work together in transmissions?	• How do we see objects? • What is reflection? • What is refraction? • What are the colours in white light?	• What happens when materials are burned? • How can we group materials on the basis of their properties? • Why are different materials used for certain purposes?	• Who was Charles Darwin and what did he discover about evolution? • How can external factors affect the evolution of a species and how do fossils provide evidence of this? • How have humans adapted and evolved over time and how has human behaviour affected change in other species?
Opportunities for practical enquiry	• Explore forces in action – gravity, air resistance, water resistance and friction experiments • Levers, pulleys and gears investigation – e.g. there is a fallen tree in the forest school area/a building has collapsed due to WW2 bombing. How will you move it?	• Mirror investigation • Periscopes – You are in a WW2 submarine, you want to come up to the surface but you need to know if it is safe. • The shape of shadows – create shadow puppets, explore how you can make it appear different. Notice the things you can and cannot change about a shadow.	• What happens when we place metals into acids? • Plan an experiment to isolate components of a mixture • Dissolving investigation – which materials will dissolve? • Materials investigation: What should I wrap my ice-cream in to stop it melting at the beach? What should I make my winter coat out of? What materials should I use to make black-out curtains or blinds? • How could we separate a mixture of dirty water?	• Bird beak adaptation investigation
Discussed and displayed vocabulary	accelerate air resistance attract balanced brake decelerate direction distance effect float force friction Galileo Galilei gear gravity Isaac Newton magnetism mass mechanism momentum motion pulley repel spring stretch surface thrust velocity water resistance	absorb artificial block distort filters illuminate light light-source material mirror natural opaque particle periscope permeate prism rainbow reflect reflection refract shadow shine spectrum surface theory transparent translucent travels wave	atom biological burn change chemical chemist condensation conductivity corrosive degrees density dissolve electrical conductor element energy evaporation filtering freeze gas hardness heat insulation irreversible change liquid magnetism matter melt mix mixture molecule oxygen properties reversible change rust Ruth Benerito separate sieve solid solidify solubility solution Spencer Silver steam thermal conductor transparency transparent volume	adaptation adaptive traits Alfred Wallace animals appearance breed characteristic Charles Darwin DNA environment evolution extinct fossil fossilisation generation genes habitat humans identical individual inheritance inherited traits insects living things Mary Anning natural naturalist nature Neanderthal offspring organisms palaeontology parent plants predator prey reproduce research rocks scientist selection species survival taxonomy theory variation

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	Autumn B (1)	Autumn B (2)	Spring B (1)	Spring B (2)	Summer B (1)	Summer B (2)
Area of study	Electricity	Animals including humans (Year 6 content)	Living things and their habitats (Year 5 content)	Living things and their habitats (Year 6 content)	Earth and space	Animals including humans (Year 5 content)
Curriculum objectives	• 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	• 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	• 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 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	• 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	• describe the changes as humans develop to old age
Lines of enquiry	• What is static electricity? • What are circuits and their components? • What are the conventional symbols for circuits? • How is the brightness of a bulb/the speed of a motor changed? • How can we plan, carry out and evaluate an experiment to see how changing a wire in a circuit affects the brightness of a bulb?	• What are historical health problems caused by poor diet and how has the work of scientists helped us develop a better understanding of how diet affects health? • Why is having a variety of foods and food groups important for a healthy diet? • How are nutrients and water transported in the human body? • What happens to the heart when we exercise?	• How do flowering plants reproduce? • How do non-flowering plants reproduce? • How do animals reproduce? • How do the life cycles of animals living in different environments compare to each other? • How do different animals reproduce and grow? • What can we learn from the work of naturalists and animal behaviourists?	• How can we group organisms according to their characteristics? • How can we distinguish between organisms that have similar characteristics? • How can we classify plants according to their characteristics? • How can we use the work of Carl Linnaeus to identify, classify and answer questions about different organisms?	• How do the Sun, Earth and Moon move? • How does the rotation of Earth create day and night? • How does the Earth's tilt create seasons? • What are the phases of the Moon? • How have ideas about the solar system changed throughout history? • What objects are in our solar system, alongside planets?	• What are the main stages in the life cycle of humans? What factors may affect the rate of growth in humans? • How do humans reproduce? What are the stages in the gestation period of humans and how does this compare to other animals? • What are the stages of development during infancy and childhood?

	• How can we use circuits to create simple devices?	• How do muscles move the skeleton and why does muscle activity require increased blood flow? • What are the effects of tobacco, alcohol and other drugs? • What can we do to keep our bodies healthy?		• What are microorganisms and how can they be grouped? • How can we identify and classify organisms in our local area?		How do the needs of children change over time as they develop? • What are the roles of some hormones in the body? How do they affect changes at the start of puberty? • What changes occur during puberty and how do these changes differ for boys and girls? • How does the human body change during adulthood and old age?
Opportunities for practical enquiry	• Circuit investigations – predictions, number of cells, voltage	• Exercise enquiry, for example, the effect of exercise on heart rates	• How can we use cuttings to clone a potato? • Explore the different ways that plants can reproduce asexually by planting bulbs, tubers, strawberries and cuttings. Observe how they grow.	• Organism discovery in local habitats	• NASA 'On the Moon' challenges (links to engineering) • Create a sun dial	• Home learning – Design a questionnaire to interview an older relative and record the changes they have experienced as they have aged. Answer questions based on finding about what is more or less likely to happen as we age. Discuss which elements might be preventable or depend on the environment and conditions we live in.
Discussed and displayed vocabulary	ammeter bioelectricity brightness bulb buzzer conductor crocodile clips current clean energy danger flow fossil fuel fuse incomplete insulator lightning motor negative nuclear energy positive power station renewable energy resistance series circuit shock solar panel static electricity switch symbol tidal energy voltage volume voltmeter wind turbine	alcohol blood blood vessels bones brain breathe calcium carbohydrates carbon dioxide circulate circulatory system damage diet digest digestion digestive drugs enzymes exercise growth fibre fruit healthy heart hinge impact internal lifestyle joints nutrients organs oxygen kidney ligaments liver lungs metabolism minerals movement muscle muscular nutrients platelets protect protein pulse release skeletal skeleton smoke substances sugar support tobacco vegetable ventricle vitamin	ageing amphibian animal asexual behaviourist bird bloom cutting David Attenborough desert differences disperse distribute embryo fertilise germinate insect Jane Goodall mammal naturalist ocean organism plant pollinate prehistoric rainforest reproduce scatter sexual similarities tuber	animal amphibian arachnid Aristotle arthropods binomial bird Carl Linnaeus characteristics class classify classification compare crustacean differences dichotomous domain environment exoskeleton family fish flowering fungus genus habitat insect invertebrate kingdom leaves mammals micro-organism mollusc mushroom myriapods non-flowering order organism phylum plants predators prey reptiles similarities species tree vertebrates worms	Alhazen Aristotle astronaut atmosphere axis blast Brahe comet Copernicus cosmonaut day decompress Earth eclipse educated engineer enormous explorer galaxy geocentric Galileo heliocentric hemisphere historic infinite launch lunar mission Moon moons navigate night orbit outer perilous pilot planet probe profound propel Ptolemy radiation report rocket rotate satellite scientific season spherical star Solar System Sun tilt transmit travel universe vast	adolescence adult adulthood ageing baby child childhood develop fertilisation foetus gestation growth growth rate hormones infant infancy lifecycle life expectancy pregnant pregnancy old age puberty reproduce teenager toddler