Woodhouse Academy

Science Curriculum Overview

Year 5 Curriculum overview

Term	Main focus of teaching each term
Autumn 1	**Forces** Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object (size of forces) (exploring falling paper cones or cupcake cases, and designing and making a variety of parachutes and carrying out fair tests to determine which designs are the most effective). Identify the effects of air resistance, water resistance and friction, that act between moving surfaces (They might explore resistance in water by making and testing boats of different shapes.)Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect (They might design and make products that use levers, pulleys, gears and/or springs and explore their effects.)Pupils might find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation.
Autumn 2	**Animals Including Humans** Describe the changes as humans develop to old age (puberty). Gestation in animals and humans.
Spring 1	**Properties and Changes of 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 (evaporating, filtering, sieving, melting, dissolving). 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 (conductors and insulators) 'Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?'. 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 (when burning different materials or baking bread or cakes.)They should find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton.

Term	Main focus of teaching each term
Spring 2	**Living Things and their Habitats** Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird (comparison of local to around the world). Local environment. Naturalists and animal behaviourists (David Attenborough and Jane Goodall). Describe the life process of reproduction in some plants and animals (sexual and asexual. Changes in an animal over time.
Summer 1	**Earth and Space** Describe the movement of the Earth and other planets relative to the sun in the solar system (creating simple models of 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 (comparing the time of day at different places on the Earth through internet links and direct communication, constructing simple shadow clocks and sundials, finding out why some people think that structures such as Stonehenge might have been used as astronomical clocks.)Pupils should find out about the way that ideas about the solar system have developed, understanding how the geocentric model of the solar system gave way to the heliocentric model by considering the work of scientists such as Ptolemy, Alhazen and Copernicus.
Summer 2	**Practical Project** 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

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Science Curriculum Overview

Year 6 Curriculum overview

Term	Main focus of teaching each term
Autumn 1	**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. Deciding where to place rear-view mirrors on cars; designing and making a periscope and using the idea that light appears to travel in straight lines to explain how it works. Rainbows, colours on soap bubbles, objects looking bent in water, and coloured filters.
Autumn 2	**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. Skeletal, muscular and digestive systems. Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function (scientific research). Describe the ways in which nutrients and water are transported within animals, including humans.
Spring 1	**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 (crossbreeding). Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. Pupils might find out about the work of palaeontologists such as Mary Anning and about how Charles Darwin and Alfred Wallace developed their ideas on evolution.
Spring 2	**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 (classify animals into commonly found invertebrates (such as insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals). Classification keys. Give reasons for classifying plants and animals based on specific characteristics. Pupils might find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification. They could research unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system.

Term	Main focus of teaching each term
Summer 1	**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, motors. Use recognised symbols when representing a simple circuit in a diagram, series circuits only (designing and making a set of traffic lights, a burglar alarm).
Summer 2	**Practical Project** 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

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Science Curriculum Overview

Year 7 Curriculum overview

Term	Main focus of teaching each term
Autumn 1	**Particles and their Behaviour** • the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure • changes of state in terms of the particle model **Forces** • forces as pushes or pulls, arising from the interaction between 2 objects • using force arrows in diagrams, adding forces in 1 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 • force-extension linear relation; Hooke's Law as a special case • work done and energy changes on deformation • non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets, and forces due to static electricity

Term	Main focus of teaching each term
Autumn 2	**Cells** • cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope • the functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts • the similarities and differences between plant and animal cells • the role of diffusion in the movement of materials in and between cells • the structural adaptations of some unicellular organisms • the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms **Elements, Atoms and Compounds** • a simple (Dalton) atomic model • differences between atoms, elements and compounds • chemical symbols and formulae for elements and compounds • conservation of mass changes of state and chemical reactions **Sound** • 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 loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal • the auditory range of humans and animals
Spring 1	**Structure and Function of Body Systems** • the structure and functions of the human skeleton, to include support, protection, movement and making blood cells • biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles • the function of muscles and examples of antagonistic muscles **Chemical Reactions** • chemical reactions as the rearrangement of atoms • representing chemical reactions using formulae and using equations • combustion, thermal decomposition, oxidation and displacement reactions

Term	Main focus of teaching each term
Spring 2	**Light** • 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; photosensitive 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 **Reproduction** • 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
Summer 1	**Acids and Alkalis** • defining acids and alkalis in terms of neutralisation reactions • the pH scale for measuring acidity/alkalinity; and indicators • reactions of acids with metals to produce a salt plus hydrogen • reactions of acids with alkalis to produce a salt plus water • what catalysts do **Space** • 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

Term	Main focus of teaching each term
Summer 2	**Practical Project** • ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience • make predictions using scientific knowledge and understanding • select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables • use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety • make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements • apply sampling techniques

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Science Curriculum Overview

Year 8 Curriculum overview

Term	Main focus of teaching each term
Autumn 1	**Periodic Table** • the varying physical and chemical properties of different elements • the principles underpinning the Mendeleev periodic table • the periodic table: periods and groups; metals and non-metals • how patterns in reactions can be predicted with reference to the periodic table • the properties of metals and non-metals • the chemical properties of metal and non-metal oxides with respect to acidity **Electricity and Magnetism**
Autumn 2	**Health and Lifestyle** • the effects of recreational drugs (including substance misuse) on behaviour, health and life processes • the content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed • calculations of energy requirements in a healthy daily diet • the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases • the tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts) • the importance of bacteria in the human digestive system • plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots **Separation Techniques** • the concept of a pure substance • mixtures, including dissolving • diffusion in terms of the particle model • simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography • the identification of pure substances

Term	Main focus of teaching each term
Spring 1	**Energy** • simple machines give bigger force but at the expense of smaller movement (and vice versa): product of force and displacement unchanged • heating and thermal equilibrium: temperature difference between 2 objects leading to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference; use of insulators • other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels **Ecosystem** • the reactants in, and products of, photosynthesis, and a word summary for photosynthesis • the dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere • the adaptations of leaves for photosynthesis • the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops • the importance of plant reproduction through insect pollination in human food security • how organisms affect, and are affected by, their environment, including the accumulation of toxic materials
Spring 2	**Metals and Acids** • the order of metals and carbon in the reactivity series • the use of carbon in obtaining metals from metal oxides • properties of ceramics, polymers and composites (qualitative)
Summer 1	**Motion and Pressure** • speed and the quantitative relationship between average speed, distance and time (speed = distance ÷ time) • the representation of a journey on a distance-time graph • relative motion: trains and cars passing one another • atmospheric pressure, decreases with increase of height as weight of air above decreases with height • pressure in liquids, increasing with depth; upthrust effects, floating and sinking • pressure measured by ratio of force over area – acting normal to any surface

Term	Main focus of teaching each term
Summer 2	**The Earth** • the composition of the Earth • the structure of the Earth • the rock cycle and the formation of igneous, sedimentary and metamorphic rocks • Earth as a source of limited resources and the efficacy of recycling • the composition of the atmosphere • the production of carbon dioxide by human activity and the impact on climate **Adaptation and Inheritance** • 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 • differences between species • the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation • the variation between species and between individuals of the same species meaning some organisms compete more successfully, which can drive natural selection • changes in the environment which 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 • the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material