Science Curriculum

Intent

It is our intention to provide a high-quality Science education that provides children with the foundations they need to recognise the importance of Science in every aspect of daily life, it stimulates pupil's curiosity and develops their sense of enquiry.

The Primary Knowledge Curriculum is used to plan The Duston School Science curriculum. The curriculum is well sequenced (eg. The Human Body is revisited and built upon at the beginning of each academic year) and the knowledge taught is valued and specified (eg. A diverse range of scientists are taught). Knowledge is taught to be remembered through retrieval practice and prior knowledge being revisited. Substantive and disciplinary knowledge are intertwined and revisited to ensure that children have a firm understanding of key concepts.

Discrete Science lessons are taught, recognising the identity of the discipline, fostering a love for Science content that will flourish as children move through the curriculum. Links are made across the curriculum, where appropriate, so that children make connections to further embed their learning.

The Duston School Science curriculum covers all objectives from the National Curriculum. To ensure that our Science curriculum is ambitious and meets the needs of the children at The Duston School, we have also included the Science units:

- Taking Care of the Earth (Year 1)
- Electricity and Astronomy (Year 2)
- Cycles in Nature (Year 3)
- Ecology (Year 4)
- Meteorology (Year 5)
- Reproduction (Year 6)

These units have been chosen to either give children a foundational understanding before they revisit the units further on in their primary school journey eg. Electricity and Astronomy (Year 2) or because we believe that these are important world issues which we want our children to have a firm understanding about so that they can have an informed opinion in discussions (Taking Care of the Earth (Year 1) and Ecology (Year 4).

Implementation

Detailed unit plans are provided, which support teachers with their subject knowledge and sequences learning progressively. Weekly Science lessons are taught and take a structured approach with all lessons starting with a prior learning review, where children are supported to retrieve prior knowledge and make connections.

We have an emphasis on explicitly teaching vocabulary, and each lesson includes introducing, orally rehearsing, and engaging with key vocabulary. Key vocabulary is contextualised throughout the lesson and children are given opportunities to apply new language. Information is presented in small steps, clearly explained and modelled, and children have many opportunities to talk, answer questions, explain their learning and work independently.
Throughout lessons, teachers assess/monitor children's responses and provide effective feedback.

Assessment tasks are undertaken at the end of each unit and can include: multiple choice quizzes and written tasks.

Curriculum Map, Key Knowledge Goals and Key Vocabulary

Biology	
Chemistry	
Physics	
Key Knowledge Goals	

	Curriculum Map and Key Knowledge Goals					
	EYFS					
	Autumn 1	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
	All About Me **To know that the body has many different parts.** To know that the body can do amazing things.	**Transport – Past and Present** To know that there are different types of water transport around the world (floating)	**Space** **To know that we live on Earth.** To know that there are planets in our solar system. To know that the planets in our solar system are very different. To know that the stars we see in the sky are very far away.	**Growing and Changing** To know that we have four seasons; spring, summer, autumn, winter. **To know that plants need water and light to grow.** To know that some plants, change throughout the year.	**Kings and Queens** To think about how we could improve our school or local area.	**Stories from the Past** To know that animals are often important in stories.
	Key Vocabulary *Head, brains, shoulders, arms, knees, hands, feet, ankles, wrists, elbows, fingers knuckles, fingernails, ears, eyes, nose, scientist, skin, bones, muscles, skulls, sensory,*	*Key Vocabulary* *Sailing boat, ship, car ferry, , gondola, canal, river, sea, ocean float, sink, heavy, light, balance, surface*	*Key Vocabulary* *Earth, planet, gravity, sun, daylight, night time, orbit, Sun, Mercury, gas Venus, Earth, Mars Jupiter, Saturn, Uranus, Neptune, stars, planet, galaxy, solar system*	*Key Vocabulary* *Spring, summer, autumn, winter, sun, snow, wind, rain, leaves seed, soil, light, seedling, plant, grow, water, deciduous, evergreen, spring, summer, autumn, winter,*	*Key Vocabulary* *Pollution, rubbish, recycling, parking, bins,*	*Key Vocabulary* *Animal, dog, cat, tortoise, similarities, differences,*
	Key Stage 1					
	Autumn 1	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Year 1	**The Human Body** To identify, name, label and draw the basic parts of the human body. **To identify and label parts of our body relating to our senses.**	**Animals and their Needs** To describe a variety of animals using scientific vocabulary. To know that animals can be grouped by their features or what they eat. To know that there are wild and domestic animals.	**Seasons and Weather** **To know that we have four seasons.** To understand how the weather changes throughout the year. To explain the importance of accurate forecasts.	**Taking Care of the Earth** To know that there are natural and man-made resources. To know that some resources are renewable. To identify some of the ways in which the environment can be polluted.	**Plants** **To name and describe the purpose of parts of a plant, and what they need in order to grow.** To understand that some trees are evergreen, and some are deciduous. To understand that plants are grown for food.	**Materials and Magnets** **To know that materials have different properties.** To know that Magnetism is a force we cannot see.

	Key vocabulary: *head neck skull face ears eyes nose mouth hair teeth arms legs elbows knees fingers toes feet hands hearing touch taste smell sight iris pupil vision eardrum vibration*	Key vocabulary: *Birds Fish Amphibians Reptiles Mammal Invertebrates grouping features herbivore omnivore carnivore*	Key vocabulary: *Season spring summer autumn winter wind rain sun snow rain thermometer measure observe data clouds forecast meteorologist*	Key vocabulary: *Earth world Resources natural logging flooding pollution renewable non-renewable deforestation recycle*	Key vocabulary: *Plants warmth Light grow water seeds germinate roots anchor absorb stem leaves flower evergreen deciduous*	Key vocabulary: *soft/hard transparent/ opaque rough/smooth waterproof/ absorbent flexible/rigid properties purpose force attract repel*
Year 2	**The Human Body** To know that our bodies contain bones and muscles. **To understand ways of keeping our bodies healthy.** To know that our digestive system takes nutrients from food to help us stay healthy.	**Living Things and their Environment** **To identify some plants and animals, and their habitats.** To understand that habitats provide for the basic needs of the plants and animals. To know that animals and plants are suited to their habitats	**Electricity** To know that electricity is an energy that we can store or use to make things work. To know that an electrical circuit is a wire loop that allows electricity to travel around it.	**Plants** To be able to observe and describe how seeds and bulbs grow into mature plants. To find out and describe how plants need water, light and a suitable temperature to stay healthy.	**Materials and Matter** **To know that the materials used around us have different properties.** To understand that solids have a definite shape, but some are malleable. To know that liquids flow freely	**Astronomy** To know about the planets in our solar system. To know that Earth travels around the sun. To know that the moon orbits the earth. To be able to describe and name some constellations. To know that scientists explore space.
	Key Vocabulary: *skeleton bones skull backbone muscle organs protect joint offspring survive digestion stomach energy process waste heart circulation*	Key Vocabulary: *alive dead inanimate breathe move reproduce eat habitat microhabitat producer consumer food chain*	Key Vocabulary: *conduct insulate current mains store electricity energy buzzer appliance battery circuit electricity flow battery wire bulb*	Key Vocabulary: *Seed bulb germinate sprout plant trees observe mature fruit flower temperature*	Key Vocabulary: *materials soft properties hard purpose dull shiny opaque transparent strong flimsy solid liquid shape atoms*	Key Vocabulary: *Planet Mercury Venus Earth Mars Jupiter Saturn Uranus Neptune Pluto solar system planet orbit sun rotate axis seasons moon waxing waning*
	Lower Key Stage 2					
	Autumn 1	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Year 3	**The Human Body** To know our bones help us to move and protect some parts of our bodies. **To know that the brain is the centre of the nervous system.** To describe the simple functions of the basic parts of the digestive system	**Cycles in Nature** **To know that our natural environment changes as the seasons change.** To understand how plants can change through the seasons. To know that some animals migrate. To know the stages in the life cycle of a frog.	**Rocks** To know there are many different types of rocks. To know that geologists sort rocks into three main groups. To understand that some rocks allow water to pass through. To recognise that soils are made from rocks and organic matter	**Forces and Magnets** To know that a force is a push or a pull. To know that friction is the force between two surfaces. To know that magnets have an invisible push or pull force.	**Plants** To know that flowering plants all have roots, a stem or trunk, but do not look the same. To know that different plants need different amounts of things in order to thrive. **To understand the role of different parts of a plant.**	**Light** To know that we need light to see things. To know that transparent and opaque materials effect light passing through. To know that mirrors can reflect light in different ways. To know that shadows change during the day.

	Key Vocabulary *endoskeleton femur, stirrup skull, cranium ligaments joint spinal column ribs, scapula pelvis cerebrum cerebellum medulla, nerves cerebral, cortex digest, nutrition, saliva digestive oesophagus small intestine large intestine*	Key Vocabulary *cycle, seasons Earth, orbit, axis sun, tilt, planet hemisphere, sap, energy, ripen, mature, decay dormant reproduce germination seed dispersal hibernate tadpoles frogspawn metamorphosis*	Key Vocabulary *Light, darkness absence, source, natural artificial, retina protect transparent opaque, absorb transmit, reflect translucent plane, concave convex, reflect reflection shadow, predict record, observe*	Key Vocabulary *Botanist, stem function, feature, Agnes Arber, Joseph Banks, thrive pollen hydrangea Sunflower, cactus absorb roots, transport, pollination pollinator reproduce, seed, anther stigma, seed*	Key Vocabulary *Rock, mineral smooth, crumbly observation geologist layers sedimentary metamorphic pressure igneous volcano, magma, lava permeable impermeable decay organic matter, sandy chalky, clay*	Key Vocabulary *Force, push, pull contact force gravity magnetism friction, heat reduce, increase, metal iron, lodestone north, south attract, repel, magnetic field, strong, weak*

Year 4	**The Human Body** To know that cells are the building blocks of the human body. To know that we need nutrition. To identify the different types of teeth and their function. To know how food is digested and excreted. **To know the essential vitamins and minerals a body needs.**	**Classification of Plants and Animals** To understand that we can classify animals and plants. To know that fish and amphibians are vertebrates **To know the key features of reptiles, birds, mammals, insects, arachnids and molluscs.** To know that plants can be classified into flowering and non-flowering.	**Ecology** To know that living things depend on their habitats. To understand that living things are linked within a food chain. To know that living things depend on each other in an ecosystem. To know how humans have changed the environment in our local area.	**Sound** To understand how sound is produced and how it travels. To know sound travels through the air. To know the difference between pitch and volume. To understand how the human voice makes different sounds. To know that vibrations in sound waves travel through the different parts of the ear.	**States of Matter and the Water Cycle** **To know that there are three main states of matter.** To know that evaporation occurs when water turns into gas. To know that condensation occurs when water vapour turns into liquid. To know that precipitation returns water to the surface of the Earth.	**Electricity** **To know that electricity is useful, but also dangerous.** To know how to construct an electrical circuit. To know that switches open and close a circuit. To know that the lightbulb was a very important invention. To identify materials that conduct electricity.
	Key Vocabulary *Cell, organs tissue, system Nutrition, food group, incisor Canine, premolar molar, omnivore enamel, oesophagus stomach small intestine large intestine vitamin minerals iron, calcium magnesium zinc*	Key Vocabulary *classification vertebrates invertebrates backbone internal skeleton cold-blooded warm-blooded gills amphibians lungs scales mammals lungs, hatch arachnid mollusc insects abdomen thorax flowing reproduce photosynthesis*	Key Vocabulary *microhabitat Polar desert Rainforest producer consumer decomposer cycle living thing energy organisms predator prey ecosystem organism web pollution environment plastic emissions*	Key Vocabulary *vibration soundwaves matter gases sound barrier speed of sound quiet pitch high vocal cord voice box vibrations pitch larynx cartilage ear canal ear drum bones hammer anvil stirrup cochlea auditory*	Key Vocabulary *Solid liquid gas water steam water vapour humidity evaporate condenses droplets precipitation gravity stratus cumulus cirrus cumulonimbus nimbostratus rain snow hail sleet*	Key Vocabulary *Safety caution danger electric shock frayed wire plug socket circuit electricity flow battery bulb switch component filament Edison Latimer conduct insulate pass through*

	Upper Key Stage 2					
	Autumn 1	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Year 5	**The Human Body** **To recognise the first stages of human growth; gestation, birth and infancy. To know that the human body changes as it goes through puberty.** To identify physical and mental changes to the human body as we age.	**Materials** To understand that materials can be grouped according to their properties. To know that thermal conductivity means heat can be transferred through a material. To know that a solution is a mixture of a solid in a liquid.	**Living Things** To know that mammals and amphibians have different life cycles. To know that insects and birds have different life cycles. **To know that flowering plants need pollen to reproduce.** To know that naturalists dedicate their lives to the natural world.	**Forces** To know that a force is either a push or a pull. To know that friction occurs when two objects move against each other. To know that objects with a large surface area will have greater air resistance. To know how surface area affects speed of fall in air (or water).	**Astronomy** To know that astronomers believe the universe began with the Big Bang. To understand that gravity is a force that holds objects together. **To know the planets of our Solar System.** To understand the Moon's phases	**Meteorology** **To know the atmosphere protects Earth and enables life.** To know that human actions impact the atmosphere. To know a weather front is a boundary where warm and cold air meet. To know storms are caused by electrical charge.
	Key Vocabulary *Growth gestation puberty old age adolescence hormones puberty metabolism reproduce*	*Key Vocabulary* *Property material transparent opaque shiny dull conductor insulator hard soluble insoluble rigid flexible thermal conductor insulator fair temperature thermometer mixture dissolve solution*	*Key Vocabulary* *mammal amphibians metamorphosis hibernation incubate larvae life cycle gamete fertilisation embryo seed germinate sepals stamens anther pistil pollination Goodall Attenborough*	*Key Vocabulary* *force push pull increase decrease gravity friction air resistance water resistance streamline parachute up thrust float buoyancy surface area variable control dependent*	*Key Vocabulary* *Astronomy Theorise Big Bang universe matter galaxy space light year mass black hole orbit Solar System Mercury Venus Earth Mars Jupiter Saturn Uranus Neptune Pluto moon waning waxing crescent*	*Key Vocabulary* *meteorology atmosphere troposphere stratosphere mesosphere thermosphere exosphere ozone depletion synoptic chart warm front cold front boundary cumulonimbus electrical charge thunder lightning*
Year 6	**The Human Body** **To know that the heart pumps blood around the body.** To know that blood vessels transport blood around the body. To know how the heart rate can speed up or slow down, depending on what the body is doing.	**Classification of Living Things** To know there are five kingdoms of organisms. To know that plant and animal cells are different. To know that taxonomy is used to show how organisms are related to each other.	**Electricity** **To know that electricity flows in a circuit.** To know how the number of cells and voltage affects buzzers and bulbs. To know that switches control the flow of electricity in a circuit. To know how to apply knowledge to make an electrical toy.	**Light** To know that light is a source of illumination that allows us to see. To know that light enters our eyes, enabling us to see. To know what light is made of and how a prism works.	**Reproduction** To know that asexual reproduction does not require male and female cells. To understand sexual reproduction in flowering plants. To understand sexual reproduction in animals. To know that different animals have different growth stages.	**Evolution** To know fossils are physical evidence of life from long ago. To know offspring are usually similar to, but not identical to their parents. **To know living things can adapt to suit their environment.**

	Key Vocabulary atrium (atria) ventricle(s) valves aorta pulmonary circuit systemic circuit blood vessels arteries veins capillaries blood pressure heart rate pulse oxygen exercise drugs	Key Vocabulary classification taxon organism plants animals protest fungi bacteria cell cell membrane cytoplasm nucleus vacuole mitochondria cell wall chloroplast chlorophyll taxonomy class species	Key Vocabulary Current electricity series circuit short circuit cells voltage switch kill switch incomplete circuit purpose design components	Key Vocabulary illumination artificial source darkness optic nerve cornea iris pupil lens muscles retina brain prism refract/refraction white light rainbow	Key Vocabulary reproduce asexual cycle cell division regeneration gamete birth fertilisation life embryo seed germinate sepals stamens anther pistil ovary sperm pollination sexual zygote reproduction embryo foetus	Key Vocabulary prehistoric sedimentary rock fossil organism palaeontologist offspring inheritance variation mutation DNA adapt biomes habitat evolution Darwin Wallace

Impact

The Duston School Science curriculum has clearly specified knowledge that we want our children to know, do and remember. When reviewing impact, we assess against the Knowledge Goals laid out in the curriculum, enabling us to check whether children can remember what we set out for them to learn. Assessment tasks are carefully planned and take the form of: multiple choice quizzes, written tasks or blanked our Knowledge Organisers. We carry out subject-specific monitoring and curriculum reviews to assess impact and use these to plan for future development. Monitoring includes: Pupil Voice activities, Book Looks, conversations with teachers, learning walks and planning and resource (PPT) checks. Children talk enthusiastically about what they have learned, in Science lessons, using ambitious scientific vocabulary in context.

Values

Children demonstrate the Primary Phase values of Care, Challenge and Succeed throughout their Science learning.

Care:

Care is threaded throughout the Science curriculum. Children show care by understanding and explaining the importance of taking care of animals, plants, our community and the wider world. When learning about the human body in Y2, Y4 and Y6, children gain key knowledge about food, teeth and exercise and develop their understanding of the care that their body needs. Specific units are studied which centre on our value of care, these include: Animals and their needs (Year1), Taking care of the Earth ((Year 1) and Ecology (Year 4). Significant people who have shown great care for the natural world are included in our Science curriculum. Some of these are David Attenborough (natural historian Yr5) and Dame Jane Goodall (primatologist Yr5).

Challenge:

Children are challenged to learn new knowledge throughout the Science curriculum. All children are challenged with a 'step for depth' activity in all Science lessons. Threaded throughout the curriculum are significant people who have, themselves, faced and overcome challenges to bring about scientific change. Some of these are: William Harvey (first blood transfusions Yr6)), John Henry Holmes (inventor of the electrical light switch Yr6)), Lewis Latimer (Inventor Yr4), Darwin (Historical biologist – natural selection Yr6)), Mary Anning (Palaeontologist Yr3), Carl Linnaeus (botanist Yr2), John Dunlop (inventor of first inflatable tyre Yr1).

Succeed:

Children have opportunities to succeed in all their Science learning. Scaffolding and assessment for learning is used effectively so that all children can succeed in their Science lessons. Throughout the Science curriculum, children have opportunities to apply their knowledge and to succeed in scientific investigations, multiple choice quizzes and in explaining their learning either through talk or written work.