DOGSTHORPE ACADEMY – progression & sequencing within Science Curriculum

National Curriculum Aims

Science explains the material world. By learning about the products of science, pupils are able to explain the world around them. By learning how scientific enquiry establishes scientific knowledge, pupils learn about its nature and status.

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Scientific understanding and knowledge develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics	**Working scientifically** develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them	**Science in action** are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future

Scientific knowledge and conceptual understanding (Substantive knowledge)	**Working Scientifically (Disciplinary Knowledge)**
It is vitally important that pupils develop secure understanding of each key block of knowledge and concepts in order to progress to the next stage. Pupils should be able to describe associated processes and key characteristics in common language, but they should also be familiar with, and use, technical terminology accurately and precisely. They should build up an extended specialist vocabulary. They should also apply their mathematical knowledge to their understanding of science, including collecting, presenting and analysing data.	'Working scientifically' specifies the understanding of the nature, processes and methods of science for each year group. It is not taught as a separate strand. 'Working scientifically' is embedded within the content of biology, chemistry and physics, focusing on the key features of scientific enquiry, so that pupils learn to use a variety of approaches to answer relevant scientific questions. These types of scientific enquiry include: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources. Pupils seek answers to questions through collecting, analysing and presenting data.

Scientific concepts	Connections	Misconceptions	Recall	Approach	Four core areas
Substantive knowledge in science is organised around key scientific concepts. Pupils will build increasingly secure and complex schemata for these concepts, throughout their school career, by knowing and remembering more.	*Substantive concepts are connected and related to each other across our curriculum. This ensures our pupils know how knowledge is organised in each discipline.*	*Our teachers anticipate and addresses likely pupil misconceptions using examples from the history of science and/or explicitly teaching pupils why the misconception is scientifically wrong.*	*Over time, substantive knowledge remembered in long-term memory should become increasingly organised and connected for our pupils*	*Scientific enquiry refers to the systematic approaches used by scientists to generate new knowledge. It encompasses a range of methods (not just 'data' collection) including: planning, implementing, analysing and drawing conclusions.*	*<u>Pupils' disciplinary knowledge advances in broadly four areas through the science curriculum:</u> 1. Methods to answer scientific questions 2. Apparatus and techniques, including measurement 3. Analysis, presentation and evaluation of scientific data to draw valid conclusions. 4. Development of scientific knowledge over time - this involves knowledge of how scientific laws and theories develop over time.*

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Substantive knowledge across year groups:

	Plants	Animals inc humans	Living things & their habitats	Materials	Energy	Forces, Earth & space	Making Connections
Year 1	*	*		*		*	*
Year 2	*	*	*	*			*
Year 3	*	*		*	*	*	*
Year 4		*	*	*	*		*
Year 5		*	*	*	*		*
Year 6		*	*		*		*

Working Scientifically (Disciplinary Knowledge) across key stages:

	Methods to answer scientific questions	Apparatus and techniques, including measurement	Analysis, presentation and evaluation of scientific data to draw valid conclusions	Development of scientific knowledge over time and its implications
KS1	*Asking simple questions. Identifying and classifying.*	*Gathering and recording data.* *Observing closely using simple equipment e.g. hand lens.*	*Using their observations and ideas to suggest answers to questions.*	
LKS2	Using different types of scientific enquiries to answer questions. Setting up fair tests, make predictions.	Taking accurate measurements using standard units, use a range of equipment incl. thermometers.	Recording findings using bar charts, keys, tables, labelled diagrams. Draw conclusions. Make predictions for new values, suggest improvements.	Using scientific evidence to support findings.
UKS2	Planning different types of scientific enquiries. Recognising and controlling variables.	Taking measurements with increasing accuracy and precision. Taking repeat readings.	Scatter graphs, linegraphs, causal relationships. Degree of trust in results.	Identifying scientific evidence used to support or refute ideas or arguments.

Seven key areas curriculum coverage:

Plants	Animals inc humans	Living things & their habitats	Materials	Energy	Forces, Earth & space	Making Connections

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Long term plan:

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 3	**Movement and nutrition** *Study the human skeleton and identify key bones and compare them to other animals explaining the role within the body. *Explore how changes in muscles result in movement and the implications these discoveries have in the scientific development of prosthetic limbs. *Study how energy is used by the body, what constitutes a balanced diet in humans and how research contributes to nutritionist expertise.	**Forces and magnets** *Investigate the movement of vehicles on different surfaces and learn about the impact of friction and compare uses and drawbacks. *Broaden experience in writing scientific methods and recording data as they investigate contact and non-contact forces. *Explore the properties of different magnets and use this to understand their uses.	**Rocks and soil** *Study rocks and their properties to learn how to classify rocks and identify how they were formed. *Look at the work of paleontologists to learn about fossil formation and use models to explore how fossils tell us about the past. *Investigate the physical properties of rocks and link these to their particular uses. *Explore soil formation, separate soil using a sedimentation jar and test soil drainage.	**Light and shadows** *Identify examples of light sources *Learn that light is needed to see and how its absence causes darkness. *Investigate reflection and shadow formation, including how different factors affect shadows. *Explore how shadows can be used to entertain in the arts and create shadow puppets to recount how different people work or experiment with light.	**Plant reproduction** *Describe the functions of named parts and use evidence to explain their significance in plant development. *Investigate further factors that may affect the growth of plants and compete with their peers to disperse seeds in a variety of ways. *Explore how seeds vary and define the type of plant they are studying, as well as looking at how seed shapes have inspired modern technologies.	**Does hand span effect grip strength?** *Experiment and analyse data and draw conclusions to explore the relationship between hand span and grip strength. *Test different gloves to improve grip strength and applying their newfound knowledge to design friction gloves, fostering scientific inquiry and problem-solving skills.
Year 4	**Digestion and food** *Using models, describe the function of key organs in the digestive system. *Identify the types of human teeth to create a model and investigate factors that impact our dental health. *Compare human teeth to other animals' and consider this in the light of prior knowledge about predators, prey and food chains. *Take on the role of a naturalist investigating animal faeces for clues about diet, digestion and dentition.	**Electricity and circuits** *Explore appliances that use electricity in their setting *Learn how to work with electricity safely and build circuits. *Investigate electrical conductors and insulators and explore the relationship between the number of bulbs and bulb brightness. *Understand scientific progression and home safety through real scenarios and historical discoveries.	**States of matter** *Investigate the properties of solids, liquids and gases *Learn about the different states of matter. *Explore changes of state using relatable examples and use this to explain changes to water through the water cycle *Investigate the relationship between temperature and rate of evaporation while broadening their experience of working scientifically.	**Sound and vibrations** *Explore different ways of producing sounds *Learn about the relationship between vibrations and what they hear. *Study dolphins and whales to develop understanding of how sound travels between objects and investigate the role of insulation to protect our ears. *Explore how pitch and volume can be altered and make their own musical instruments to demonstrate these principles.	**Classification and changing habitats** *Identify different ways living things can be grouped *Make classification keys to explore which grouping methods are most effective. *Study ways that habitats may change over time and understand that humans can have both positive and negative effects on their surroundings. *Play the role of naturalists and review the impact of conservation programmes.	**How does the flow of liquids compare?** Consider methods for measuring how liquids flow differently from each other. *Plan and execute an enquiry, considering different ways of representing data to support a conclusion. *Revisit the digestive system and explore how the flow of different liquids should be considered when producing different medicines.
Year 5	**Mixtures and separation** *Explore different types of mixtures and the different methods that can be used to separate them. *Dissolve a range of substances, identify different solutions and investigate how temperature affects the time taken to dissolve. *Design and create a water filter, sieve soil and evaporate solutions.	**Properties and changes** *Investigate hardness, transparency and conductivity and consider how these properties influence the uses of materials. *Explore reversible changes, including dissolving and changes of state. *Compare irreversible changes, including rusting, burning and	**Earth and space** *Explore some of the key celestial bodies in our Solar System and learn their names and compare their movements. *Discover the relationship between the Earth's rotation and daylight, making models to represent their knowledge. *Make their own sundials and consider how and why humans'	**Life cycles and reproduction** *Study animal life cycles and learn about the significance of reproduction for a species' survival. *Compare asexual and sexual reproduction in plants and grow cuttings to measure and plot root growth over time. *Compare the life cycles of mammals, birds, amphibians and	**Imbalanced forces** *Explore gravity, air resistance and water resistance in more depth and consider the effect of these forces being imbalanced. *Demonstrate key principles in the classroom and plan investigations to further their understanding of the effects of these forces.	**Human timeline** *Study human development and changes to identify key stages and consider what data may help determine if a child is growing normally. *Describe how puberty affects girls and boys and produce graphs to record how gestation periods vary across different animals.

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		mixing vinegar and bicarbonate of soda	ideas about the universe have changed over time.	insects identifying key differences. *Analyse secondary data to investigate how the amphibian life cycle is affected by predators and climate change.	*Test ideas using models and compete to build the most effective pulley system.	**Does the size of an asteroid affect the size of its impact crater?** *Experiment, analyse data and draw conclusions to explore the relationship between the size of model asteroids and the size of the impact crater they create. *Apply understanding of gravity, air resistance and the Earth and space to make predictions and plan and carry out an enquiry
Year 6	**Classifying big and small** *Broaden knowledge of how vertebrates, invertebrates, plants and micro-organisms are grouped using shared characteristics. *Discover how Carl Linnaeus developed the Linnaean and binomial systems for classifying and naming living things. *Use and produce classification keys to sort and identify organisms.	**Light and reflection** *Prove that light travels in a straight line and use this information to explain observations of reflection and shadows. *Explore how our eyes allow us to see and how mirrors can be used in a variety of ways. *Investigate factors affecting the size of shadows and the laws of reflection. *Apply what they have learned about light by exploring real-life uses of mirrors.	**Evolution and inheritance** *Study patterns in humans and other species and learn about characteristics that are inherited from parents and those that are environmental. *Looking at Darwin and Wallace, understand how observations lead to theories and explore natural selection. * Explain how species evolve over time and the role of fossil evidence that supports this theory. *Explain how species evolve over time and the role of fossil evidence that supports this theory by modelling the variation and natural selection of Darwin's finches	**Circuits, batteries and switches** *Using prior knowledge of electrical circuits, learn to draw conventional circuit diagrams and use models to explain current, resistance and voltage. *Compare different batteries and consider the effect on bulb brightness. *Apply knowledge of switches and electrical circuits to design and produce their own practical devices.	**Circulation and health** *Study the human circulatory system and learn about the role of the heart, blood and blood vessels and use models to demonstrate their function. *Explore how lifestyle choices affect our health and use secondary sources to advise patients. *Devise an investigation to look at the relationship between exercise and heart rate, applying knowledge of variables and then analysing secondary data to understand fitness better.	**Are some sunglasses safer than others?** (5 lessons) *Explore sun safety and investigate the efficacy of different sunglasses. *Devise enquiries to test light and UV transmission of the lenses to form a conclusion about which sunglasses are best *Apply knowledge of electrical circuits to provide a light source in the experiment. *Summarise their findings through presentations and advertisements.

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Progression of knowledge for each key area:

Plants	Animals inc humans	Living things & their habitats	Materials	Energy	Forces, Earth & space	Making Connections

		Year 1 *Introduction to plants*	Year 2 *Plant growth*	Year 3 Plant reproduction
Plants	**Plant structure and function**	• *To know a variety of common plants, and how they differ.* • *To know that deciduous trees lose their leaves seasonally, but evergreen trees do not.* • *To know the basic structure (including leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem) of a variety of common plants, including flowering plants and trees.*		• To understand the functions of the basic parts of a plant and the relationship between structure and function. • To know that water is transported within a plant from the root, through the stem, to the leaves.
	Plant growth and needs	• *To begin to understand how plants grow and change over time.*	• *To know that seeds and bulbs grow into seedlings by producing roots and shoots.* • *To know that seedlings grow into mature plants by developing parts, that may include stems/trunks, leaves, flowers and fruits.* • *To know that seeds need water to germinate.* • *To know that plants need water, light and a suitable temperature for growth and health.*	• To know that plants need water, light, air, nutrients/fertilizer and a suitable temperature for growth and health. • To understand that the needs for growth and health vary from plant to plant.
	Plant life cycle			• To know the life cycle of a plant from seed to mature plant. • To know that flowers are the reproductive organ of a plant. • To know that the process of pollination is the transfer of pollen to the female (part of the) flower. • To know that the process of seed formation is the growth of a seed after pollination/fertilisation. • To know some different methods of seed dispersal and the benefits of each.

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		Year 1 *Sensitive bodies* *Comparing Animals*	Year 2 *Life cycles and health*	Year 3 Movement and nutrition	Year 4 Digestion and food	Year 5 Human timeline	Year 6 Circulation and health
Animals inc humans	Animal growth	• *To know a variety of common animals (including fish, amphibians, reptiles, birds and mammals).*	• *To understand how living things change, and that animals have offspring that grow into adults.* • *To know which offspring comes from which parent animal.* • *To know the stages in some animal life cycles.*			• To describe the human life cycle, including the stages of growth & development (baby, toddler, child, teenager, adult, elderly). • To describe changes that occur during puberty (in boys and girls). • To know that gestation periods vary across mammals.	
	Animal structure and function	• *To know the main body parts of common animals (arms, legs, wings, tails, fins, head, trunk, horns/tusks, shell)* • *To know key parts of the human body (including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth).* • *To know the five main senses: sight, smell, hearing, taste and touch.* • *To know that the skin is used for touch, the tongue is used for taste, the nose is used for smell, the eyes are used for sight and the ears are used for hearing.*		• To know that animals can be grouped based on the presence of a skeleton. • To know that the skeleton in humans and some animals is used for movement, protection and support. • To know that the muscular system in humans and some animals works with the skeleton for movement. • To know the main bones in the body.	• To know the main organs of the human digestive system (mouth, teeth, tongue, oesophagus, stomach, small and large intestines) and describe their simple functions. • To know the different types of human teeth (incisor, canine, premolar and molar) and their simple functions.		• To know the main parts of the human circulatory system (heart, blood vessels and blood). • To know that the heart pumps blood around the body. • To know that the blood vessels transport blood around the body. • To know that the blood transports vital substances around the body, including oxygen and nutrients. • To understand the relationships between different organ systems.

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	Health and nutrition	• *To know that a carnivore is an animal that eats other animals and give some examples.* • *To know that a herbivore is an animal that eats only plants and give some examples.* • *To know that an omnivore is an animal that eats both animals and plants, and to give some examples.*	• *To know that animals, including humans, need water, food and air to survive.* • *To understand the importance of exercise, a balanced diet and hygiene for humans.*	• To know that animals, including humans, need the right types and amount of nutrition. • To understand that humans cannot make their own food and therefore eat to get the nutrition needed. • To know the main food groups (carbohydrates, protein, fats, fibre, vitamins, minerals and water) and their simple functions. • To know that a balanced diet should include all food groups. To describe the diets of different animals.	• To know that teeth can be damaged, including the effect of sugary and acidic food. • To know that it is important to brush teeth twice a day, make good food choices and visit the dentist regularly. • To describe the teeth of carnivores and herbivores, and understand why they are different. • To know that predators hunt for their food and prey are the animals being hunted. • To know that producers make their own food. To know that food chains begin with a producer followed by consumers, and arrows to show the energy passed on.		• To understand the impact of diet, exercise, drugs and lifestyle on the way a body functions. • To know that the heart rate is the number of beats per minute and breathing rate is the number of breaths per minute. • To know that exercise increases heart and breathing rates.

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		Year 2 *Habitats* *Microhabitats*	Year 4 Classification and changing habitats	Year 5 Life cycles & reproduction	Year 6 Classifying big and small Evolution and Inheritance
Living things and their habitats	**Characteristics of living thing**	• *To begin to understand some of the life processes, including movement, reproduction, sensitivity, growth, excretion and nutrition.* • *To know the difference between things that are living, dead, and things that have never been alive, using some of the life processes.*	• To know that living things can be grouped in different ways. • To know that a classification key can be used to group and identify plants and animals. • To know that vertebrates are animals which have a backbone and invertebrates are animals which do not have a backbone. • To know that plants can be grouped into flowering or non-flowering varieties. • To know that flowering plants include grasses and non-flowering plants includes ferns and mosses. • To know that there are five main vertebrate groups: birds, mammals, reptiles, amphibians and fish. • To know that invertebrate groups include snails, slugs, worms, spiders and insects.		• To know that 'organism' is a term used to refer to an individual living thing. • To know that micro-organisms are incredibly small and cannot usually be seen by the naked eye. • To know the characteristics of the different groups of vertebrates and commonly found invertebrates.
	Variation and inheritance	• *To know a variety of plants and animals and describe*		• To know that a life cycle shows the changes an animal or plant goes through until the reproduction of a new generation when the cycle starts again. • To know that all living things must reproduce for the species to survive. • To know that sexual reproduction requires two parents, whereas asexual reproduction only requires one parent. • To know that there are different processes plants and animals use to reproduce (asexual and sexual reproduction).	• To know that living things have changed over time. • To know that fossils provide us with information about living things that inhabited the Earth millions of years ago. • To know that characteristics are passed from parents to their offspring, but that all offspring vary from their parents. • To know that over time, variation in offspring can affect animals' chances of survival in particular environments
	Habitats & interdependence	• *To name a variety of habitats, including woodland, ocean, rainforest and seashore.* • *To know that a habitat is the environment where an animal or plant lives/ grows, because it provides what they need to survive.* • *To know that a micro-habitat is a very small habitat (e.g. stones, logs and leaf litter).* • *To know that living things depend upon each other (e.g. for food, shelter.)* • *To understand that a food chain can be used to show how animals obtain food from eating either plants and/or other animals. some differences.*	• To know that habitats can change throughout the year and this can be dangerous for living things. • To know that humans can have both a positive and negative impact on the environment.		• To know that animals and plants have adapted to suit their environment over many millions of years and that this process can be called evolution.

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		Year 1 *Everyday materials*	*Year 2* *Use of everyday materials*	Year 3 Rocks and soil	Year 4 States of matter	Year 5 Mixtures and separation Properties and changes
Materials	**Identifying and naming**	• *To know that objects are items or things.* • *To know that a material is what an object is made from.* • *To identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock.*		•To know that rocks can be grouped based on their appearance or properties, (e.g. colour, texture, hardness, permeability.) •To know that rocks may contain grains, crystals or fossils. •To know that grains and crystals appear differently and can be used to classify rocks. •To know that soils are made from rocks and dead matter.	• To know that all substances around us can exist as solids, liquids and gases.	
	Properties and uses	• *To know that property refers to how a material can be described.* • *To describe the physical properties of a variety of everyday materials.* • *To understand that materials can be grouped based on their physical properties.*	• *To know why objects are made from particular materials and to give examples of their suitability.* • *To know that one material can be used for a range of purposes (and to give examples.)* • *To know that different materials can be used for the same purpose (and to give examples.)* • *To know why certain materials are unsuitable for particular objects.*	• To understand the relationship between the properties of rocks and their uses.	• To know that a property of a solid is that it keeps its shape unless a force is applied to it. • To know that a property of a liquid can flow freely and take on the shape of a container. • To know that a property of a gas does not have a fixed shape and can escape from an unsealed container.	• To describe a broader range of materials and their properties, including hardness, solubility, transparency, conductivity and response to magnets.

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	Change		• *To know that a push or pull must be applied to change the shape of a solid object.* • *To know that solid objects can be squashed, bent, twisted or stretched.* • *To know that different solid objects may take a different amount of force to change shape*	• To know that fossils can form from the remains of living things. • To know that rocks can change over time (e.g. erosion, weathering).	• To know that heating causes solids to turn into liquids (melting) and liquids to turn into gases (evaporating). • To know that cooling causes gases to turn into liquids (condensing) and liquids to turn into solids (freezing). • To know that water can exist as a solid, a liquid or a gas. • To know that the melting point of water is zero degrees Celsius and the boiling point of water is 100 degrees Celsius. • To know that water flows around the world in a continuous process called the water cycle. • To know that in the water cycle, evaporation is when bodies of water are heated and turn into water vapour. • To know that in the water cycle, condensation is the process of water vapour cooling to form water droplets in clouds, which can result in precipitation. • To know that the rate of evaporation increases as temperature rises.	• To know that some substances will dissolve in a liquid to form a solution. • To know the factors that affect the time taken to dissolve, including temperature and stirring. • To understand that dissolving, mixing and changes of state are reversible changes. • To know that some liquids and solids can be separated using sieving, filtering and evaporation and to describe these processes. • To understand that some changes result in the formation of new materials and that these are usually irreversible. (e.g. burning, rusting, the action of acid on bicarbonate of soda.)

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		LIGHT		SOUND	ELECTRICITY	
		Year 3 Light and shadows	Year 6 Light and reflection	Year 4 Sound and vibration	Year 4 Digestion and food	Year 6 Circulation and health
Energy	Sources	• To know that light travels from a source (e.g. the Sun, light bulbs and torches). • To know that light is needed to see things and that dark is the absence of light. • To know that light from the Sun can be dangerous and how to protect their eyes.	• To know that light travels in a straight line from a light source. • To understand that luminous objects are seen as a result of light directly entering the eye, whereas non-luminous objects reflect light into the eye.	• To understand that sound is a result of vibrations	• To know that all electrical appliances need a power source, including batteries or mains electricity. • To know that an electrical circuit needs a complete path for the electrical charge to flow through. • To know the main components in a simple series circuit. • To know the precautions for working safely with electricity.	• To know a wider variety of components in a series circuit (including buzzer and motor). • To know the conventions used to draw circuit diagrams, including the recognised symbols for common components and using straight lines.
	Transfer	• To know that all materials reflect light. • To know that shadows are formed when the light from a light source is blocked by an opaque object	• To know that shiny surfaces reflect light uniformly. • To know that when light is reflected off a surface, its direction changes. • To know that mirrors and periscopes work using reflection of light on smooth surfaces. • To understand why shadows have the same shape as the objects that cast them as a result of light travelling in straight lines. • To understand relationships between light sources, objects and shadows.	• To know that vibrations from sounds travel through mediums to the ear. • To know that an insulating material reduces the amount of vibrations that pass through it and this can be used to protect the ears from damaging sounds. • To know that different materials provide different amounts of insulation against sound.	• To know that some materials allow electrical charge to pass through them quickly and these are known as electrical conductors (e.g. metals). • To know that some materials do not allow electrical charge to pass through them easily and these are known as electrical insulators (e.g wood and plastic). • To know that metals are used for cables and wires because they are good conductors of electricity. • To know that plastic is used to cover cables and wires because it is a good insulator.	
	Factors affecting energy	• To know that shadows change as a result of different factors: - Changing the position of the light source. - Changing the distances between the light source, object and surface. • To know that shadows change position and length throughout the day as the Sun changes position in the sky.	• To understand how and why the distance between the object and the screen affects the size of the shadow. • To understand how the angle of a reflected ray is affected by the angle of the incoming ray on a smooth surface.	• To know a variety of ways to change the pitch or volume of a sound. • To know that quicker vibrations cause higher-pitched sounds and slower vibrations cause lower-pitched sounds. • To know that stronger vibrations cause louder sounds and weaker vibrations cause quieter sounds. • To know that sounds get fainter as the distance from the sound source increases.	• To understand that an open switch breaks a series circuit so the components will be off. • To understand that a closed switch completes a series circuit so the components will be on. • To understand the relationship between bulb brightness and the number of bulbs in a circuit.	• To know that the voltage of a circuit can be changed and how this affects bulb brightness (or buzzer volume).

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		Year 1 *Seasonal changes*	Year 5 Earth and space	Year 3 Forces and magnets	Year 5 Imbalanced forces
Forces, Earth & Space	**Key facts**	• *To know the name and order of the four seasons; spring, summer, autumn and winter.* • *To know that it is unsafe to look directly at the Sun.*	• To know that the Sun is a star at the centre of our solar system. • To know that the Sun, Earth and Moon are approximately spherical bodies. • To know the names, order and relative positions of the planets and other main celestial bodies. • To know that a moon is a celestial body that orbits a planet and give examples of moons that orbit other planets.	• To know some examples of contact and non-contact forces. • To know that some forces are a result of contact between two surfaces, but some forces can act at a distance (e.g. magnetism). • To know the North and South poles of a magnet. • To know some examples of magnetic materials, including iron and nickel, and how they react to a magnet and each other. • To know some different examples of magnets, including bar, horseshoe, button and ring, • To know some uses of magnets.	• To know that gravity is a non-contact force that pulls objects together. • To know that air resistance and water resistance are both types of friction.
	Forces in motion	• *To know weather associated with the four seasons and how it changes (in the UK).* • *To understand that day length varies across the four seasons, with fewer daylight hours in the winter and more in the summer.*	• To know that the Earth and other planets orbit around the Sun. • To know that the tilt of the Earth and its orbit around the Sun causes the seasons. • To know that the Moon orbits around the Earth. • To understand how the Earth's rotation causes day and night and the apparent movement of the Sun across the sky.	• To know that friction is a contact force that acts between two surfaces to slow an object down. • To know that magnetism is a non-contact force that affects objects containing magnetic metal. • To understand that the opposite poles of a magnet attract one another and like poles repel one another.	• To know that unsupported objects fall towards the Earth because of gravity. • To know that friction, air resistance and water resistance act in the opposite direction to a moving object. • To know that when forces are imbalanced, the speed, shape or direction of an object changes. • To know that when forces are balanced the speed, shape or direction of an object stays the same. • To know that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect.
	Factors affecting forces			• To know that rougher surfaces have more friction between them than smoother surfaces. • To understand that the strength of different magnets may vary.	• To know that rougher surfaces have more friction between them than smoother surfaces and how that may affect movement. • To know that the larger the surface area of an object the greater the air or water resistance it creates.

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Progression of skills (working scientifically):

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Observing (qualitative data)	*Using their senses to describe, in simple terms, what they notice or what has changed.*		Using their senses to describe, in more detail and with simple scientific vocabulary, what they notice or what has changed.		Using their senses to describe, in detail and with a broader range of scientific vocabulary, what they notice or what has changed.	
Measuring (quantitative data)	*Using non-standard units to measure and compare.* *Beginning to use standard units to measure and compare.* *Beginning to use simple measuring equipment to make approximate measurements.* *Reading simple numbered scales.*		Using standard units to measure and compare. Using measuring equipment with increasing accuracy. Reading scales with unmarked intervals between numbers.		Using standard units to measure and compare with increasing precision (decimals). Reading a wider variety of scales with unmarked intervals between numbers.	
Researching	*Gathering specific information from one simplified, specified source.*		Gathering specific information from a variety of sources.		Gathering answers to open-ended questions from a variety of sources.	
Recording (diagrams)	*Drawing and labelling simple diagrams.*		Beginning to draw more scientific diagrams by: ● Using some standard symbols. ● Drawing in 2D to produce simple line diagrams. ● Labelling with more scientific vocabulary.		Drawing scientific diagrams by: ● Using a wider range of standard symbols. ● Drawing with increasing accuracy. ● Labelling with a broader range of scientific vocabulary. ● Annotating diagrams to explain concepts and convey opinions.	
Recording (tables)	*Using a prepared table to record results including:* ● *Numbers.* ● *Simple observations.* ● *Tally frequency.*		Using a prepared table to record results including more detailed observations. Using tables with more than two columns. Identifying and adding headings to tables. Beginning to design simple results tables.		Using tables with columns that allow for repeat readings. Suggesting headings to tables, including units. Designing results tables with increasing independence with consideration of variables where applicable. Calculating the mean average.	
Grouping and classifying	*Grouping based on visible characteristics. Organising questions to create a simple classification key.*		Grouping based on visible characteristics and measurable properties. Populating a pre-prepared branching and number key. Choosing appropriate questions for classification keys.		Grouping in a broader range of contexts. Organising the layout of number and branching keys. Formulating appropriate questions for classification keys.	

DOGSTHORPE ACADEMY – progression & sequencing within Science Curriculum

Graphing	*Representing data using pictograms and block charts.*	Representing data using bar charts. Drawing bars with greater accuracy. Reading the value of bars with greater accuracy.	Representing data by using line graphs and scatter graphs. Plotting points with greater accuracy. Reading the value of plotted points with greater accuracy
Analysing and drawing conclusions	*Using their results to answer simple questions.* *Beginning to recognise when results or observations do not match their predictions.*	Writing a conclusion to summarise findings using simple scientific vocabulary. Beginning to suggest how one variable may have affected another. Beginning to quote results as evidence of relationships. Identifying data that does not fit a pattern (anomalous data). Recognising when results or observations do not match their predictions. Beginning to use identified patterns to predict new values or trends.	Writing a conclusion to summarise findings using increasingly complex scientific vocabulary. Suggesting with increasing independence how one variable may have affected another. Quoting relevant data as evidence of relationships. Identifying anomalies in repeat data and excluding results where appropriate. Comparing individual, class and/or model data to the prediction and recognising when they do not match. Using identified patterns to predict new values or trends.
Evaluating	*Beginning to recognise whether a test is fair or not.*	Beginning to identify steps in the method that need changing and suggest improvements. Beginning to identify which variables were difficult to control and suggesting how to better control them. Commenting on the degree of trust by reflecting on: ● Results that do not fit a pattern (anomalies). ● The quality of results (accurate measurements and maintaining control variables). Beginning to identify new questions that would further the enquiry	Identifying steps in the method that need changing and suggesting improvements. Identifying which variables were difficult to control and suggesting how to control them better. Commenting on the degree of trust by also reflecting on: ● Accuracy (human error with equipment). ● Reliability (repeating results). ● Sources of information (e.g. websites, books). Posing new questions in response to the data that would extend the enquiry. Deciding what data to collect to further test direct relationships.