Skills & Knowledge progression: Science

National Curriculum – Aims and purpose	School aims - skills, attitudes and knowledge that we would like all children to develop on their journey through the school
Purpose of study A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes. **Aims** The national curriculum for science aims to ensure that all pupils: • develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics • 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 • are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future	We want our children to have an interest in science and how it impacts our daily lives. We want them to constantly be asking questions, both 'big' and 'small', as they seek to better understand the world they live in and the fundamental scientific laws that govern it. Moreover, we want to ensure that they understand the role that science (and scientists) has played in our past and how it will continue to play a vital role in our future, especially in the areas of healthcare and the environment. By the time that they leave education, we want all children to have become informed, curious, scientifically literate citizens, and our science curriculum is designed to build the broad foundations of that goal. During science lessons, we will ensure that children are given the opportunity to ask ambitious questions and then plan and conduct investigations with the aim of answering these questions. In Years 1 and 2 their natural curiosity should be encouraged and they will be given the opportunity to talk about what they have found out. In Years 3 and 4, children will explore, talk about, test and develop ideas and begin to make some decisions about which types of scientific enquiry would be most effective. In Years 5 and 6, they will encounter more abstract ideas and begin to recognise that scientific knowledge changes and develops over time. Children will draw conclusions, use evidence to justify their ideas and use their understanding to explain their findings. It is key that knowledge content and practical skills are taught hand-in-hand, with children developing and building on their factual knowledge as they journey through the school, making links between topics applying skills and understanding from previous learning to new areas as they are met. As part of this it is also vital that they are exposed to and specifically taught the essential scientific vocabulary related to each topic in order to demonstrate their knowledge and understanding effectively.

Milestones:
At Stapleford Primary School children are taught in mixed age classes e.g. Years 1 & 2 together etc. Our curriculum sets out progression in the form of three 'Milestones'. The children work towards each Milestone for two years. During the first year pupils attain an understanding of the skills set out in the Milestone and during the second year they develop an advanced or deeper understanding. Each Milestone contains a range of descriptors which provide details of the skills to be covered. Over a two-year period, students become more and more familiar with these details by exploring them in a breadth of contexts. This helps pupils to "know more" and "remember more."

Links to learning in EYFS:	Links to other subjects / curriculum areas:	Experiences every child should have:
Understanding the World • Comments and asks questions about aspects of their familiar world such as the place where they live or the natural world • Can talk about some of the things they have observed such as plants, animals, natural and found objects. • Talks about why things happen and how things work • Developing an understanding of growth, decay and changes over time • Shows care and concern for living things and the environment • Looks closely at similarities, differences, patterns and change	• Use of ICT to collect data, analyse results and present findings • History - the lives and impact of famous scientists from the past • Geography - animal habitats from around the world, weather systems, rock formation • Maths - Data handling • English - posing and writing questions, presenting findings both verbally and through written observations and conclusions • Art - using plants and animals in the local and wider environment as a starting point for art • DT building structures using a variety of materials, selected for their properties and effectiveness	• Observing a range of plants and animals first-hand, in the local environment, parks, garden centres, zoos and other animal centres • Growing their own fruits and vegetables all the way through from seed to the plate • Creating electrical circuits and watching something they have constructed respond to their commands • Make things go 'bang', react vigorously and create new substances through chemical reactions • Be surprised by what happens and excited about what they discover when working practically • Make discoveries through trial and error - and not being afraid to get things wrong • Ask 'big questions' about life and the universe

Skills Progression: Science – Years 1 & 2

Year groups	Work scientifically This concept involves learning the methodologies of the discipline of science.	Biology		Chemistry		Physics	
1 & 2 Milestone 1	• Ask simple questions. • Observe closely, using simple equipment. • Perform simple tests. • Identify and classify. • Use observations and ideas to suggest answers to questions. • Gather and record data to help in answering questions.	**Understand plants** This concept involves becoming familiar with different types of plants, their structure and reproduction.	• Identify and name a variety of common plants, including garden plants, wild plants and trees and those classified as deciduous and evergreen. • Identify and describe the basic structure of a variety of common flowering plants, including roots, stem/trunk, leaves and flowers. • Observe and describe how seeds and bulbs grow into mature plants. • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.	**Investigate materials** This concept involves becoming familiar with a range of materials, their properties, uses and how they may be altered or changed.	• Distinguish between an object and the material from which it is made. • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock. • Describe the simple physical properties of a variety of everyday materials. • Compare and group together a variety of everyday materials on the basis of their simple physical properties. • Find out how the shapes of solid objects made from	**Understand movement, forces and magnets** This concept involves understanding what causes motion.	• Notice and describe how things move, using simple comparisons such as faster and slower. • Compare how different things move.
						Understand light and seeing This concept involves understanding how light and reflection affect sight.	• Observe and name a variety of sources of light, including electric lights, flames and the Sun, explaining that we see things because light travels from them to our eyes.
		Understand animals and humans This concept involves becoming familiar with different types of animals, humans and the life processes they share.	• Identify and name a variety of common animals that are birds, fish, amphibians, reptiles, mammals and invertebrates. • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. • Describe and compare the structure of a variety of common animals (birds, fish, amphibians,			**Investigate sound and hearing** This concept involves understanding how sound is produced, how it travels and how it is heard.	• Observe and name a variety of sources of sound, noticing that we hear with our ears.

			reptiles, mammals and invertebrates, including pets). • Identify name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. • Notice that animals, including humans, have offspring which grow into adults. • Investigate and describe the basic needs of animals, including humans, for survival (water, food and air). • Describe the importance for humans of exercise, eating the right amounts of different types of food and hygiene.		some materials can be changed by squashing, bending, twisting and stretching. • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick/rock, and paper/cardboard for particular uses.	**Understand electrical circuits** This concept involves understanding circuits and their role in electrical applications.	• Identify common appliances that run on electricity. • Construct a simple series electrical circuit.
		Investigate living things This concept involves becoming familiar with a wider range of living things, including insects and understanding life processes.	• Explore and compare the differences between things that are living, that are dead and that have never been alive. • Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants and how they depend on each other. • Identify and name a variety of plants and animals in their habitats, including micro-habitats. • Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.			**Understand the Earth's movement in space** This concept involves understanding what causes seasonal changes, day and night.	• Observe the apparent movement of the Sun during the day. • Observe changes across the four seasons. • Observe and describe weather associated with the seasons and how day length varies.
		Understand evolution and inheritance This concept involves understanding that organisms come into existence, adapt, change and evolve and become extinct.	• Identify how humans resemble their parents in many features.				

Skills Progression: Science – Years 3 & 4

Year groups	Work scientifically This concept involves learning the methodologies of the discipline of science.	Biology		Chemistry		Physics	
3 & 4 Milestone 2	• Ask relevant questions. • Set up simple, practical enquiries and comparative and fair tests. • Make accurate measurements using standard units, using a range of equipment, e.g. thermometers and data loggers. • Gather, record, classify and present data in a variety of ways to help in answering questions. • Record findings using simple scientific language, drawings, labelled diagrams, bar charts and tables. • Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. • Use results to draw simple conclusions and suggest improvements, new questions and predictions for setting up further tests.	**Understand plants** This concept involves becoming familiar with different types of plants, their structure and reproduction.	• Identify and describe the functions of different parts of flowering plants: roots, stem, leaves and flowers. • Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant. • Investigate the way in which water is transported within plants. • Explore the role of flowers in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.	**Investigate materials** This concept involves becoming familiar with a range of materials, their properties, uses and how they may be altered or changed.	**Rocks and Soils** • Compare and group together different kinds of rocks on the basis of their simple, physical properties. • Relate the simple physical properties of some rocks to their formation (igneous or sedimentary). • Describe in simple terms how fossils are formed when things that have lived are trapped within sedimentary rock. • Recognise that soils are made from rocks and organic matter. **States of Matter** • Compare and group materials together, according to whether they are solids, liquids or gases.	**Understand movement, forces and magnets** This concept involves understanding what causes motion.	• Compare how things move on different surfaces. • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Observe how magnets attract or repel each other and attract some materials and not others. • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. • Describe magnets as having two poles. • Predict whether two magnets will attract or repel each other,
		Understand animals and humans This concept involves becoming familiar with different types of animals, humans and the life processes they share.	• Identify that animals, including humans, need the right types and amounts of nutrition, that they cannot make their own food and they get nutrition from what they eat. • Construct and interpret a variety of food chains, identifying producers, predators and prey. • Identify that humans and some animals have skeletons and muscles for support, protection and movement. • Describe the simple functions of the basic parts of the digestive system in humans. • Identify the different types of teeth in humans and their simple functions.				

	• Identify differences, similarities or changes related to simple, scientific ideas and processes. • Use straightforward, scientific evidence to answer questions or to support their findings.	**Investigate living things** This concept involves becoming familiar with a wider range of living things, including insects and understanding life processes.	• Recognise that living things can be grouped in a variety of ways. • Explore and use classification keys. • Recognise that environments can change and that this can sometimes pose dangers to specific habitats.		• Observe that some materials change state when they are heated or cooled, and measure the temperature at which this happens in degrees Celsius (°C), building on their teaching in mathematics. • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.		depending on which poles are facing.
		Understand evolution and inheritance This concept involves understanding that organisms come into existence, adapt, change and evolve and become extinct.	• Identify how plants and animals, including humans, resemble their parents in many features. • Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. • Identify how animals and plants are suited to and adapt to their environment in different ways.			**Understand light and seeing** This concept involves understanding how light and reflection affect sight.	• Recognise that they need light in order to see things and that dark is the absence of light. • Notice that light is reflected from surfaces. • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. • Recognise that shadows are formed when the light from a light source is blocked by a solid object. • Find patterns in the way that the size of shadows change.
						Investigate sound and hearing This concept involves understanding how sound is produced, how it	• Identify how sounds are made, associating some of them with something vibrating. • Recognise that vibrations from

						travels and how it is heard.	sounds travel through a medium to the ear.
						Understand electrical circuits This concept involves understanding circuits and their role in electrical applications.	• Identify common appliances that run on electricity. • Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. • Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. • Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. • Recognise some common conductors and insulators, and associate metals with being good conductors.

						Understand the Earth's movement in space This concept involves understanding what causes seasonal changes, day and night.	• Describe the movement of the Earth relative to the Sun in the solar system. • Describe the movement of the Moon relative to the Earth.

Skills Progression: Science – Years 5 & 6

Year groups	**Work scientifically** This concept involves learning the methodologies of the discipline of science.	**Biology**		**Chemistry**		**Physics**	
5 & 6 Milestone 3	• Plan enquiries, including recognising and controlling variables where necessary. • Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work. • Take measurements, using a range of scientific equipment, with increasing accuracy and precision. • Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs, and models.	**Understand plants** This concept involves becoming familiar with different types of plants, their structure and reproduction.	• Relate knowledge of plants to studies of evolution and inheritance. • Relate knowledge of plants to studies of all living things.	**Investigate materials** This concept involves becoming familiar with a range of materials, their properties, uses and how they may be altered or changed.	• Compare and group together everyday materials based on evidence from comparative and fair tests, including their hardness, solubility, conductivity (electrical and thermal), and response to magnets. • Understand how some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution.	**Understand movement, forces and magnets** This concept involves understanding what causes motion.	**Magnets** • Describe magnets as having two poles. • Predict whether two magnets will attract or repel each other, depending on which poles are facing. **Forces** • Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.

	• Report findings from enquiries, including oral and written explanations of results, explanations involving causal relationships, and conclusions. • Present findings in written form, displays and other presentations. • Use test results to make predictions to set up further comparative and fair tests. • Use simple models to describe scientific ideas, identifying scientific evidence that has been used to support or refute ideas or arguments.				• 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		• Identify the effect of drag forces, such as air resistance, water resistance and friction that act between moving surfaces. • Describe, in terms of drag forces, why moving objects that are not driven tend to slow down. • Understand that force and motion can be transferred through mechanical devices such as gears, pulleys, levers and springs. • Understand that some mechanisms including levers, pulleys and gears, allow a smaller force to have a greater effect.

		Understand animals and humans This concept involves becoming familiar with different types of animals, humans and the life processes they share.	• Describe the changes as humans develop to old age. • Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. • Recognise the importance of diet, exercise, drugs and lifestyle on the way the human body functions. • Describe the ways in which nutrients and water are transported within animals, including humans.		this kind of change is not usually reversible, including changes associated with burning, oxidisation and the action of acid on bicarbonate of soda.	**Understand light and seeing** This concept involves understanding how light and reflection affect sight.	• Understand 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 eyes. • Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them, and to predict the size of shadows when the position of the light source changes. • 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.
		Investigate living things This concept involves becoming familiar with a wider range of living things, including insects and understanding life processes.	• 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. • Give reasons for classifying plants and animals based on specific characteristics.				
		Understand evolution and inheritance This concept involves understanding that organisms come into existence, adapt, change	• 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.			**Investigate sound and hearing** This concept involves understanding how sound is produced, how it travels and how it is heard.	• Find patterns between the pitch of a sound and features of the object that produced it. • Find patterns between the volume of a sound and the strength of

		and evolve and become extinct.	• Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.				the vibrations that produced it. • Recognise that sounds get fainter as the distance from the sound source increases.
						Understand electrical circuits This concept involves understanding circuits and their role in electrical applications.	• 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.
						Understand the Earth's movement in space This concept involves understanding what causes seasonal changes, day and night.	• 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.

Science: Curriculum covered at Stapleford Primary School

Key Stage 1 (Class 3 – Year 1 & 2) Rolling Programme

Subject	**Year A** (2022-2023), (2024-2025) (2026-2027) etc.			**Year B** (2021-2022), (2023-2024), (2025-2026) etc.		
	Autumn Term	Spring Term	Summer Term	Autumn Term	Spring Term	Summer Term
Science (See Hamilton Trust scheme of work)	AMAZING ME Y1 ***Animals including humans*** and Y2 ***Animals including humans***: focus on our bodies and health WILD WEATHER Y1 ***Seasonal changes***	BRILLIANT BUILDERS Y1 ***Everyday materials*** and Y2 ***Uses of everyday materials***: focus on uses of materials including building GROWING THINGS Y1 and Y2 ***Plants***: focus on needs of plants and growth	WILD AND WONDERFUL CREATURES Y1 ***Animals including humans*** and Y2 ***Animals including humans:*** focus on wild animals/fish. FOOD CHAINS Y2 ***Living things and their habitats***: focus on food chains	PEOPLE AND THEIR PETS Y1 ***Animals including humans*** and Y2 ***Animals including humans***: focus on pets WEATHER ART Y1 ***Seasonal changes***	BRILLIANT BUILDERS Y1 ***Everyday materials*** and Y2 **Uses of everyday materials:** focus on comparing materials ART AND NATURE Y1 and Y2 ***Plants***: focus on parts of flowering plants and trees	EXPLORING CHANGES Y1 ***Everyday materials*** and Y2 ***Uses of everyday materials:*** focus on change HABITATS AND HOMES Y2 ***Living things and their habitats***: focus on habitats

Lower KS2 (Class 2 – Year 3 & 4) Rolling Programme

Subject	**Year A** (2022-2023), (2024-2025) (2026-2027) etc.			**Year B** (2021-2022), (2023-2024), (2025-2026) etc.		
	Autumn Term	Spring Term	Summer Term	Autumn Term	Spring Term	Summer Term
Science (See Hamilton Trust scheme of work)	MAGNETIC FUN AND GAMES Year 3 ***Forces and Magnets*** FIT FOR SUCCESS Year 3 ***Animals including humans***: focus on food, nutrition, skeleton	A WORLD OF LIVING THINGS Year 4 ***Living things and their habitats*** A FEAST OF FLOWERS, FRUITS AND SEEDS Year 3 ***Plants***: focus on life cycles	WHAT'S THE MATTER? Year 4 ***States of matter*** SOUNDS SPECTACULAR Year 4 ***Sound***	THIS PLANET ROCKS Year 3 ***Rocks*** SHINING THE LIGHT Year 3 ***Light***	HABITAT HELPERS Year 4 ***Animals including humans*** GREATLY GREEN GROWERS Year 3 ***Plants***: focus on plants and their needs and how they work	THE CIRCLE OF LIFE Year 4 ***States of matter*** ELECTRIC PERSONALITIES Year 4 ***Electricity***

Upper KS2 (Class 1 – Years 5 & 6) Rolling Programme

Subject	**Year A** (2022-2023), (2024-2025) (2026-2027) etc.			**Year B** (2021-2022), (2023-2024), (2025-2026) etc.		
	Autumn Term	Spring Term	Summer Term	Autumn Term	Spring Term	Summer Term
Science (See Hamilton Trust scheme of work)	ILLUSTRATING LIFE CYCLES Y5 ***Living things and their habitats*** MATERIALS CONSULTANTS Y5 ***Properties and changes of materials***	THE HUMAN SPECIES Y5 and Y6 ***Animals including humans*** THEATRE LIGHTING TECHNICIANS Y6 ***Light***	ELECTRIC ART Y6 ***Electricity*** MEDICAL MANOEUVRES Includes more Y5 and Y6 content on ***Animals including humans***	SPECIAL EFFECTS MATERIALS Y5 ***Properties and changes of materials*** SPACE! Y5 ***Earth and space***	WELCOME TO FORCE-LAND Y5 ***Forces*** THE CLASSIFICATION CODE Y6 ***Living things and their habitats***	SURVIVAL OF THE FITTEST Y6 ***Evolution and inheritance*** SENSATIONAL SCIENCE Includes more Y5 and Y6 content on ***Properties and changes of materials***