Science Curriculum statement

At Higham on the Hill C of E Primary School, we use curriculum planning and resources that have been designed within our Academy Trust. The curriculum was developed collaboratively, with subject leaders across all our schools coming together to logically sequence and develop materials for teacher to use in lessons. What we want to achieve within each subject is the ability for all children to not only be ready for the next stage in their education, but to have a strong academic foundation in both the substantive and disciplinary knowledge in order to excel in their continued studies.

Our curriculum is built on the premise of what foundational knowledge and skills would a person need to know in order to have the best chance at studying the subject at university. The academic rigour in the curriculum can be seen through the strong focus on rich knowledge and subject-specific vocabulary developed within and across subjects.

We also want our children to have the ability to engage in near and far transfer of knowledge within each subject, enabling them to make links and widen their understanding of each academic discipline. The design of the curriculum supports this though linear and non-linear links both within and across subjects.

The curriculum has been designed with a 'teach to the top' and scaffold down approach, in that we are ambitious for all our pupils and expect them all to access the learning, other than those with complex needs. Our curriculum is inherently challenging through its content choices, rather than an additional 'bolt on'.

Science is designed using the most up to date thinking and research, and is under continual development and review in order to ensure it enables pupils to learn more.

The curriculum is designed to be taught in blocks of learning, so pupils can immerse themselves in a discrete subject area for a period of time, and through the carefully mapped out long term plan of the year, revisit subjects at appropriately spaced intervals in order to retrieve prior learning and embed this in long term memory. (Research Link: Spacing - Bjork & Bjork; Forgetting Curve - Ebbinghaus)

Long term plans are in place with knowledge, skills and concepts having been mapped back from the end of KS2 down to the EYFS to ensure that progression takes place, highlighting the links between what has been previously taught, and what will be taught in future years.

The long-term plan has then been broken down into units of lessons consisting of either 5, 10 or in some cases 15 lessons that are delivered sequentially. Each unit of lessons has been logically sequenced to enable children to build on knowledge in small steps both within and across lessons (Research Link: Small Steps – Rosenshine). Subject content has been specifically chosen to be meaningful for pupils, and also to provide them with a deep understanding of knowledge and concepts within each discipline.

Within the design of the science curriculum, knowledge of vocabulary plays a huge part in ensuring children are able to comprehend the information given to them. Each unit of lessons highlights subject specific vocabulary that should ideally be pre-taught to pupils so they can immediately access content. This is taught alongside Tier 2 vocabulary that will also help them comprehend across the disciplines. (Research Link: Vocabulary Prioritised - Hart, Law et al; Tier 2 & 3 Vocab - Beck et al)

To assist in enabling children to remember more over time, interleaved low-stakes quizzes are used across the year to give children the opportunity to revisit key information again from content that has been taught from throughout their schooling, as we know this is one of the most effective methods of learning. The quizzes are subject specific and are made up of content that has already been taught, but not necessarily from within the current, or even previous years learning. (Research Link: Interleaving - Bjork; Quizzes - Dunlosky)

Subject knowledge is fundamental in delivery high quality teaching, and without it deep learning of content cannot occur. Each unit of lessons is underpinned by a teacher pack that outlines the minimum key knowledge that teachers must know to be able to deliver the lesson effectively. The teacher pack also outlines the sequence of lessons, key vocabulary, prior knowledge children should know (including where and when it was taught), and where the unit fits in the progression throughout the subject. (Research Link: Subject Knowledge - Great Teaching Toolkit - Coe)

Within each lesson pupils are given the opportunity to retrieve knowledge that can then be built on. The knowledge being retrieved has been carefully selected so that children can then build on that key information, and therefore not putting additional strain on cognitive load. (Research Link: Retrieval - Rosenshine; Cognitive Load Theory - Sweller)

An element of each lesson is the utilisation of overlearning through cumulative quizzing within the units. Pupils have the opportunity to overlearn key knowledge by revisiting the cumulative quiz each day and adding more questions, while continuing to answer the ones from previous days, even if they have answered they correctly before. This allows for the continued revisiting of core knowledge within the unit of lessons. (Research Link: Overlearning - Soderstrom & Bjork; Christodoulou)

1. Yearly Planning Overview (from Rise)

Year 1

Week	Unit	Week	Unit	Week	Unit
1	Geography School Locality	**14**	Science Everyday Materials	**27**	History George Stephenson
2		**15**		**28**	Geography Hot & Cold Places
3	Science Seasonal Changes	**16**	Art Line	**29**	
4		**17**		**30**	Art Portrait & Artist Study
5	Art Colour	**18**	Geography Oceans & Seas	**31**	DT
6	History Walter Tull	**19**		**32**	CONSOLIDATION WEEK
7	Science AIH (Senses)	**20**	DT	**33**	CONSOLIDATION WEEK
8	History Remembrance	**21**	Science Plants	**34**	CONSOLIDATION WEEK
9	Geography Life in the UK	**22**	History Parliament & Royalty	**35**	SCHOOL FLEXBILITY WEEKS
10		**23**		**36**	SCHOOL FLEXBILITY WEEKS
11	History Changes in Recent Memory	**24**	Science Animals (10)	**37**	SCHOOL FLEXBILITY WEEKS
12		**25**		**38**	SCHOOL FLEXBILITY WEEKS
13	DT	**26**	History George Stephenson	**39**	SCHOOL FLEXBILITY WEEKS

Year 2

Week	Unit	Week	Unit	Week	Unit
1	N – Geography Continents	**14**	N – History Explorers	**27**	N – Geography Local Area Study
2		**15**	N – Art Self - Portraits	**28**	
3	N – Science Habitats	**16**	N – Geography Comparison Study	**29**	N – DT
4		**17**		**30**	N – History Space Race
5	N – History Local History	**18**	N – DT	**31**	
6	N – Art Henri Rousseau	**19**	N – Science Everyday Materials	**32**	CONSOLIDATION WEEK
7	N – History Victorian Life	**20**		**33**	CONSOLIDATION WEEK
8	N – Geography London Over Time	**21**	N – History The Great Fire of London	**34**	CONSOLIDATION WEEK
9		**22**		**35**	SCHOOL FLEXBILITY WEEKS
10	N – DT	**23**	N – Art Pattern & Texture	**36**	SCHOOL FLEXBILITY WEEKS
11	N – Science AIH (Keeping Healthy)	**24**		**37**	SCHOOL FLEXBILITY WEEKS
12		**25**	N – Science Plants	**38**	SCHOOL FLEXBILITY WEEKS
13	N – History Explorers	**26**		**39**	SCHOOL FLEXBILITY WEEKS

Year 3

Week	Unit	Week	Unit	Week	Unit
1	Geography Locality Changes Over Time	**14**	Science Forces & Magnets	**27**	Science Light
2		**15**	DT	**28**	History Ancient Greece
3	History Stone Age to Iron Age	**16**	History Anglo-Saxons	**29**	
4		**17**		**30**	Art Architecture
5	DT	**18**	Art Turner & Constable	**31**	Science Rocks
6	Science AIH (Nutrition & Movement)	**19**		**32**	CONSOLIDATION WEEK
7		**20**	Geography Weather & Climates	**33**	CONSOLIDATION WEEK
8	Art Line	**21**		**34**	CONSOLIDATION WEEK
9	Geography UK Changes Over Time	**22**	Science Plants	**35**	SCHOOL FLEXBILITY WEEKS
10		**23**		**36**	SCHOOL FLEXBILITY WEEKS
11	History Ancient China	**24**	DT	**37**	SCHOOL FLEXBILITY WEEKS
12		**25**	Geography Mountains	**38**	SCHOOL FLEXBILITY WEEKS
13	Science Forces & Magnets	**26**		**39**	SCHOOL FLEXBILITY WEEKS

Year 4

Week	Unit	Week	Unit	Week	Unit
1	Science Sound	**14**	Science Electricity	**27**	History Roman Empire
2	Geography Earthquakes and Volcanoes	**15**	DT Torches	**28**	Art Sculpture
3		**16**	History Vikings	**29**	Science Plants
4	DT	**17**		**30**	
5	History Tudors	**18**	Geography The Americas	**31**	DT
6		**19**		**32**	CONSOLIDATION WEEK
7	Science AIC Teeth and Eating Food Chains	**20**	Art Light	**33**	CONSOLIDATION WEEK
8		**21**		**34**	CONSOLIDATION WEEK
9	History Ancient Egyptians	**22**	Science States of Matter	**35**	SCHOOL FLEXBILITY WEEKS
10		**23**		**36**	SCHOOL FLEXBILITY WEEKS
11	Geography Coasts	**24**	Geography Rivers	**37**	SCHOOL FLEXBILITY WEEKS
12		**25**		**38**	SCHOOL FLEXBILITY WEEKS
13	Art Still Life	**26**	History Roman Empire	**39**	SCHOOL FLEXBILITY WEEKS

Year 5

Week	Unit	Week	Unit	Week	Unit
1	Geography People and Population	**14**	Art Stencil & Print	**27**	Science AIH (Lifecycles)
2		**15**	Geography Biomes	**28**	
3	Islamic Art & Architecture	**16**		**29**	DT
4		**17**	History Trafficking of Enslaved Africans	**30**	History Local Study – Richard III
5	Science Earth & Space	**18**	Science Propertied of Materials	**31**	
6		**19**		**32**	CONSOLIDATION WEEK
7	Geography Renewable Energy	**20**	DT	**33**	CONSOLIDATION WEEK
8		**21**	Geography Fairtrade	**34**	CONSOLIDATION WEEK
9	DT	**22**		**35**	SCHOOL FLEXBILITY WEEKS
10	History Benin Kingdom	**23**	History Medieval Britain	**36**	SCHOOL FLEXBILITY WEEKS
11		**24**		**37**	SCHOOL FLEXBILITY WEEKS
12	Science Forces	**25**		**38**	SCHOOL FLEXBILITY WEEKS
13		**26**	Art Textiles	**39**	SCHOOL FLEXBILITY WEEKS

Year 6

Week	Unit	Week	Unit	Week	Unit
1	History British Empire	**14**	DT	**27**	History Civil Rights
2	Geography Migration	**15**	History WW1&2	**28**	Art Renaissance
3		**16**		**29**	
4	Science Circulatory System	**17**		**30**	DT
5		**18**	Geography London & Berlin	**31**	Science Light
6	Art African Masks	**19**		**32**	CONSOLIDATION WEEK
7	History Industrial Revolution	**20**	Art Modernism	**33**	CONSOLIDATION WEEK
8		**21**	Science Classification	**34**	CONSOLIDATION WEEK
9	Science Evolution & Inheritance	**22**		**35**	SCHOOL FLEXBILITY WEEKS
10		**23**	DT	**36**	SCHOOL FLEXBILITY WEEKS
11	Geography Leicestershire Trade and Industry	**24**	Geography Globalisation	**37**	SCHOOL FLEXBILITY WEEKS
12		**25**		**38**	SCHOOL FLEXBILITY WEEKS
13	Science Electricity	**26**	History Civil Rights	**39**	SCHOOL FLEXBILITY WEEKS

2. Yearly Science Teaching Overview (from Rise)

	Autumn 1	A2	S1	S2	S1	S2
EYFS (FS2)	The Human Body	Sources of Light	Plants		Forces	Healthy Diets
Year 1	Seasonal Changes (10)	Animals including Humans (Senses) (5)	Everyday Materials (10)		Plants (5)	Animals including Humans (10)
	Seasonal Changes					
Year 2	Everyday Materials (10)	Animals including Humans – Keeping Healthy (10)	Living things in their habitats (10)		Plants (10)	
Year 3	Animals including Humans – Nutrition and Movement (10)	Light (5)	Forces and Magnets (10)	Rocks (5)	Plants (10)	
Year 4	Animals including Humans – Digestion and Teeth (10)	Sound (5)	Electricity (10)	States of matter (5) The Water Cycle	Living things in their Habitats – Classification (10)	
Year 5	Earth and Space (10)	Forces (10)	Properties of materials (10)		Animals including humans (10)	
Year 6	Animals and humans and the circulatory system (10)	Evolution and inheritance (10)	Electricity (5)	Light (5)	Living things in their environment (10)	

4. Knowledge progression document (from Rise)

Animals including humans

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. 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 (fish, amphibians, reptiles, birds and mammals, 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. Find out about and **d**escribe 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.	Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. Identify that humans and some other 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. Construct and interpret a variety of food chains, identifying producers, predators and prey.	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 impact of diet, exercise, drugs and lifestyle on the way their bodies function Describe the ways in which nutrients and water are transported within animals, including humans.

Living things and their habitats

Year 2	Year 4	Year 5	Year 6
Explore and compare the differences between things that are living, dead, and things 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 microhabitats 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.	Recognise that living things can be grouped in a variety of ways. Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. Recognise that environments can change and that this can sometimes pose dangers to living things.	Describe the differences in the life cycles of a mamma, an amphibian, an insect and a bird Describe the life process of reproduction in some plans and animals Describe the difference in the life cycles of a mammal, an amphibian, an insect and a bird. Describe the life process of reproduction in some plants and animals.	Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals. Give reasons for classifying plants and animals based on specific characteristics.

Materials

Year 1- **Everyday materials**	**Year 2 -** **Uses of everyday materials**	**Year 3 -** **Magnets**	**Year 4 -** **States of matter**	**Year 5 -** **Properties and changes of materials**
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.	Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	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, depending on which poles are facing.	Compare and group materials together, according to whether they are solids, liquids or gases. Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with Temperature.	Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and Evaporating. Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. Demonstrate that dissolving, mixing and changes of state are reversible changes. Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

Plants

Year 1	Year 2	Year 3
Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. Identify and describe the basic structure of a variety of common flowering plants, including trees.	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.	Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, 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 part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

Light

Year 3	Year 6
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.	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.

Electricity

Year 4	Year 6
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.	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.

Forces

Year 3	Year 5
Compare how things move on different surfaces. Notice that some forces need contact between 2 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 2 poles. Predict whether 2 magnets will attract or repel each other, depending on which poles are facing.	Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect.

Rocks

Year 3
Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. Describe in simple terms how fossils are formed when things that have lived are trapped within rock. Recognise that soils are made from rocks and organic matter.

Sound

Year 4
Identify how sounds are made, associating some of them with something vibrating. Recognise that vibrations from sounds travel through a medium to the ear. 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 the vibrations that produced it. Recognise that sounds get fainter as the distance from the sound source increases.

Earth and Space

Year 5
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.

Evolution and Inheritance

Year 6
Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

5. Skills progression document (from Rise)

Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
Explore the world around them and raise their own simple questions.	Raise their own relevant questions about the world around them.	Use their science experiences to explore ideas and raise different kinds of questions.
Experience different types of science enquiries, including practical activities.	Should be given a range of scientific experiences including different types of science enquiries to answer questions.	Talk about how scientific ideas have developed over time.
Begin to recognise different ways in which they might answer scientific questions.	Start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions.	Select and plan the most appropriate type of scientific enquiry to use to answer scientific questions.
Carry out simple tests.	Set up simple practical enquiries, comparative and fair tests. Recognise when a simple fair test is necessary and help to decide how to set it up.	Recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why.
Use simple features to compare objects, materials and living things and, with help, decide how to sort and group them (identifying and classifying).	Talk about criteria for grouping, sorting and classifying; and use simple keys.	Use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment.
Ask people questions and use simple secondary sources to find answers.	Recognise when and how secondary sources might help the to answer questions that cannot be answered through practical investigations.	Recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact.
Observe closely using simple equipment with help, observe changes over time.	Make systematic and careful observations Help to make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used.	Make their own decisions about what observations to make, what measurements to use and how long to make them for.
With guidance, they should begin to notice patterns and relationships.	Begin to look for naturally occurring patterns and relationships and decide what data to collect to identify them.	Look for different causal relationships in their data and identify evidence that refutes or supports their ideas.
Use simple measurements and equipment (e.g. hand lenses, egg timers) to gather data.	Take accurate measurements using standard units learn how to use a range of (new) equipment, such as data loggers / thermometers appropriately.	Choose the most appropriate equipment to make measurements with increasing precision and explain how to use it accurately. Take repeat measurements where appropriate.
Record simple data.	Collect and record data from their own observations and measurements in a variety of ways: notes, bar charts and tables, standard units, drawings, labelled diagrams, keys and help to make decisions about how to analyse this data.	Decide how to record data and results of increasing complexity from a choice of familiar approaches: scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
Use their observations and ideas to suggest answers to questions. Talk about what they have found out and how they found it out.	With help, pupils should look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions.	Identify scientific evidence that has been used to support or refute ideas or arguments.
With help, they should record and communicate their findings in a range of ways and begin to use simple scientific language.	Use relevant simple scientific language to discuss their ideas and communicate their findings in ways that are appropriate for different audiences, including oral and written explanations, displays or presentations of results and conclusions.	Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas, use oral and written forms such as displays and other presentations to report conclusions, causal relationships and explanations of degree of trust in results.
	With support, they should identify new questions arising from the data, making predictions for new values within or beyond the data they have collected and finding ways of improving what they have already done.	Use their results to make predictions and identify when further observations, comparative and fair tests might be needed.