

Primary Phase Curriculum Map 2020-21



William Hulme's Grammar School
The best in everyone™
Part of United Learning

Subject Area:

Science

Our high-quality Science curriculum provides the foundations for understanding the world. Throughout the curriculum, children are made aware of how Science has changed our lives and have an understanding of how it is vital for the world's future success. All pupils, regardless of their starting point, are given equal opportunities to develop their knowledge and love for Science, and are taught the essential aspects of the knowledge, methods, processes and uses of Science. Children are immersed in Scientific vocabulary and they are encouraged to make connections between other topics, other subjects, their local area and the world around them, in order to ensure high retention of the knowledge they acquire. Teachers, equipped with a good knowledge of Rosenshine's Principles of Instruction, help to guide and excite pupils through their effective planning and teaching, while the growth mindset culture throughout school, which teaches children to be independent and curious, encourages pupils to take responsibility for their learning and follow their own lines of enquiry. The recent introduction of a Forest Schools programme also allows children to deepen their knowledge of the world and develop and excitement for natural phenomena through practical learning.

Science at William Hulme's is about developing children's ideas and ways of working that enable them to make sense of an ever-changing and developing world: we aim to give all pupils memorable life and learning experiences through a broad and balanced curriculum.

Children who feel confident in their science knowledge and enquiry skills will be excited about science, show that they are actively curious to learn more and will see the relevance of what they learn in science lessons to real-life situations and also the importance of science in the real world.

Our Curriculum- The science curriculum consists of:

- A long term plan. This gives teachers an overview of the areas that they are going to teach to ensure National Curriculum coverage
- Unit plans. These detail the skills, knowledge and opportunities for working scientifically
- Knowledge Organisers. These are focused on the key vocabulary and concepts that will be taught.

Vertical Concept	Definition	Units
The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate.	At the Earth's surface, radiation from the Sun heats the surface and causes convection currents in the air and oceans, creating climates. Below the surface heat from the Earth's interior causes movements in the molten rock. The solid surface is constantly changing through the formation and weathering of rock.	Seasons have different weathers associated with them (Y1, Seasonal Changes) How the lengths of day and night varies (Y1, Seasonal Changes) There are different types of rock, they are formed in different ways and have their own, distinct, physical appearances. (Y3, Rocks)

Vertical Concept	Definition	Units
<p>Our solar system is a very small part of one of millions of galaxies in the Universe.</p>	<p>Our Sun and eight planets and other smaller objects orbiting it comprise the solar system. Day and night and the seasons are explained by the orientation and rotation of the Earth as it moves round the Sun. The solar system is part of a galaxy of stars, one of many millions in the Universe, enormous distances apart, many of the stars having planets.</p>	<p>The Earth's rotation results in day and night. (Y5, Earth and Space)</p> <p>Planetary objects move in relation to the sun. (Y5, Earth and Space)</p> <p>Different planets in our solar system have different features (Y5, Earth and Space)</p>
<p>Organisms are organised on a cellular basis.</p>	<p>All organisms are constituted of one or more cells. Multi-cellular organisms have cells that are differentiated according to their function. All the basic functions of life are the result of what happens inside the cells which make up an organism. Growth is the result of multiple cell divisions.</p>	<p>Humans and some other animals have a skeleton and muscles for support, protection and movement (Y3, Animals, including humans).</p> <p>The different parts of flowering plants have different functions (Y3, Plants).</p> <p>Humans have a digestive system that breaks down food so that it can be absorbed by our bodies. (Y4, Animals including humans)</p> <p>The human circulatory system consists of multiple organs carrying out different roles (Y6, Animals including humans)</p> <p>Diet, exercise, drugs and lifestyle impacts the way in which our bodies function (Y6, Animals including humans)</p>
<p>Organisms require a supply of energy and materials for which they are often dependent on or in competition with other organisms.</p>	<p>Food provides materials and energy for organisms to carry out the basic functions of life and to grow. Some plants and bacteria are able to use energy from the Sun to generate complex food molecules. Animals obtain energy by breaking down complex food molecules and are ultimately dependent on green plants for energy. In any ecosystem there is competition among species for the energy and materials they need to live and reproduce.</p>	<p>Plants need light, water and suitable temperature to grow (Y2, Plants)</p> <p>Animals obtain their food from plants and other animals (Y2, Living things and their habitats)</p> <p>For life and growth, plants need air, light, water, nutrients from soil, and room to grow (Y3, Plants).</p> <p>Animals, including humans, need the right type of nutrition which they get from the food they eat (Y3, Animals, including humans).</p> <p>The food chain model shows how organisms are reliant on other living things in order to survive (Y4, Animals including humans)</p> <p>A living thing's environment can change and this can pose dangers (Y4, Living things and their habitats)</p>

Vertical Concept	Definition	Units
<p>Genetic information is passed down from one generation of organisms to another.</p> <p>The diversity of organisms, living and extinct, is the result of evolution.</p>	<p>Genetic information in a cell is held in the chemical DNA in the form of a four-letter code. Genes determine the development and structure of organisms. In asexual reproduction all the genes in the offspring come from one parent. In sexual reproduction half of the genes come from each parent.</p>	<p>The role flowers play in the life cycle of flowering plants include pollination and seed formation (Y3, Plants)</p> <p>Animals reproduce sexually. Some plants reproduce sexually and other can reproduce asexually (Y5, Living things and their habitats)</p>
<p>The diversity of organisms, living and extinct, is the result of evolution.</p>	<p>All life today is directly descended from a universal common ancestor that was a simple one-celled organism. Over countless generations changes resulted from natural diversity within a species which makes possible the selection of those individuals best suited to survive under certain conditions. Organisms not able to respond sufficiently to changes in their environment become extinct.</p>	<p>Most living things live in habitats to which they are suited, and different habitats provide for the basic needs of the plants and animals that live in them (Y2, Living things and their habitats)</p> <p>Different plants have different requirements for life and growth (Y3, Plants)</p> <p>Different animals (mammal, an amphibian, an insect and a bird) have different life cycles (Y5, Living things and their habitats)</p> <p>Plants, animals and micro-organisms are classified based on specific characteristics (Y6, Living things and their habitats)</p> <p>Plants and animals are adapted to suit their environment in different ways. Adaptation may lead to evolution (Y6, Evolution and inheritance)</p>

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
EYFS	<p>Science in Early Years is covered through different areas of the EYFS curriculum: Understanding the World, Physical Development, and Exploring Media and Materials. Science in the Early Years is all about exploring and investigating the world. The Early Years environment is resourced to allow children to explore, problem solve, predict, make decisions and ask questions.</p> <p>Teaching of science in Early Years is often organic and is taught “in the moment” during children’s independent play. Adults in Early Years will encourage the children to be critical thinkers, to ask why things happen or talk about their thoughts on how things work. Within the continuous provision, children will be exploring and investigating properties of materials with access to resources, such as sand, water, playdough, mud, sensory tray. They will be encouraged to notice the differences and similarities in wet and dry sand, clay and playdough. In the water areas, children will explore objects that float in the water and some that sink. They will be opportunities to transport water into different vessels to make assumptions about different materials and what materials would be good for making a waterproof roof in the rain. Whilst making models, they will have to make decisions about which glue is suitable for certain materials why some materials may need a stronger glue. They will be selecting appropriate equipment for different types of construction play as well as looking at differences in natural and manmade materials. Children will experiment with magnets and discover magnetic and not magnetic materials.</p> <p>When playing outside, children will explore and investigate within the natural environment. Through the different seasons, children will be encouraged to talk about the seasonal changes that are taking place outside and its effects on the environment. During Spring, there will be opportunities to discover and learn about new life, animals and their young. Children will learn about living things and their habitats. They will also learn about growth and decay through growing their own plants, and understanding what living things need to stay alive.</p> <p>Adults will encourage children to talk about themselves, what they need to stay fit and healthy and how to look after themselves. When running around, the children will be made aware of what the effect of exercise does to their bodies.</p> <p>Nursery Talking about themselves, their similarities and differences Seasonal changes Clearing garden/planting bulbs – developing an understanding of growth decay and changes Exploring minibeasts and their habitats Observing changes in properties and materials. Observing the effects of physical activity on their bodies.</p> <p>Reception Investigations-Floating and sinking, melting, senses experiments, magnetic/non-magnetic -, light and dark-shadows, Colour, Magnifying games Exploring materials- identifying and sorting, talking about changes. Growing and understanding life cycles, talk about changes The body, being healthy -what our bodies need to stay healthy. Healthy food.</p>					

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 1	<p>Biology Animals including Humans</p> <ul style="list-style-type: none"> • 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) <ul style="list-style-type: none"> • identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense <p>The topic is accompanied by a trip to a farm.</p>	<p>Physics Seasonal changes (autumn/winter)</p> <ul style="list-style-type: none"> • observe changes across the four seasons <ul style="list-style-type: none"> • observe and describe weather associated with the seasons and how day length varies 	<p>Chemistry Everyday Materials</p> <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • compare and group together a variety of everyday materials on the basis of their simple physical properties 	<p>Biology Plants</p> <ul style="list-style-type: none"> • 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 <p>This topic will be supported and accompanied by Forest Schools activities once a week for the full half term.</p>	<p>Physics Seasonal changes (spring/summer)</p> <ul style="list-style-type: none"> • observe changes across the four seasons <ul style="list-style-type: none"> • observe and describe weather associated with the seasons and how day length varies 	<p>Scientists and Inventors</p> <p>Lego (Ole Kirk Christiansen) Carl Hagenbeck Mae Jemison</p> <ul style="list-style-type: none"> • Link learning about everyday materials to the properties of Lego. • Link learning about a variety of animals to learning about Carl Hagenbeck. • Explore how scientists invent and discover things.
Year 2	<p>Biology The Environment</p> <ul style="list-style-type: none"> • Compare two different measurements. • Draw a simple conclusion from the results of a test. • Identify the material of an object. • Suggest ways to reduce, reuse and recycle. • Take a survey using a tally. <ul style="list-style-type: none"> • Think of a way to teach people to use less energy. • Communicate ideas to other people. • Use different sources to find out answers to questions. 	<p>Biology Living Things and their Habitats</p> <ul style="list-style-type: none"> • explore and compare the differences between things that are living, dead, and things that have never been alive <ul style="list-style-type: none"> • 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 	<p>Biology Animals including Humans</p> <ul style="list-style-type: none"> • notice that animals, including humans, have offspring which grow into adults • find out about 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 	<p>Biology Plants</p> <ul style="list-style-type: none"> • 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 	<p>Chemistry Uses of Everyday Materials</p> <ul style="list-style-type: none"> • 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. 	<p>Scientists and Inventors</p> <p>Charles Macintosh Rachel Carson</p> <ul style="list-style-type: none"> • Explore how scientists invent and discover things. • Explore the importance of some famous scientists and link their discoveries to our previous learning.

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 3	<ul style="list-style-type: none"> Label the animal groups. Measure an amount of water in ml. Record the amount of water measured. Answer questions about an animal they have researched. 	<ul style="list-style-type: none"> 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. <p>This topic will be supported and accompanied by Forest Schools activities once a week for the full half term.</p>				
	<p>Chemistry Rocks</p> <ul style="list-style-type: none"> 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 Understand who Inge Lehmann was. 	<p>Biology Animals Including Humans</p> <ul style="list-style-type: none"> 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. 	<p>Physics Forces and Magnets</p> <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> describe magnets as having two poles predict whether two magnets will attract or repel each other, depending on which poles are facing. 	<p>Physics Light</p> <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> 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 	<p>Biology Plants</p> <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> 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 <p>This topic will be supported and accompanied by Forest Schools activities once a week for the full half term.</p>	
	<p>Chemistry States of Matter</p> <ul style="list-style-type: none"> compare and group materials together, according to whether they are solids, liquids or gases 	<p>Physics Sound</p> <ul style="list-style-type: none"> identify how sounds are made, associating some of them with something vibrating 	<p>Physics Electricity</p> <ul style="list-style-type: none"> 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 	<p>Biology Living Things and their Habitats</p> <ul style="list-style-type: none"> recognise that living things can be grouped in a variety of ways 	<p>Biology Animals including Humans</p> <ul style="list-style-type: none"> describe the simple functions of the basic parts of 	
Year 4						

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 5	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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. 		<ul style="list-style-type: none"> 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. <p>This topic will be supported and accompanied by Forest Schools activities once a week for the full half term.</p> <p>This topic will also be accompanied by a visit from a Mini Beast company.</p>	<p>the digestive system in humans</p> <ul style="list-style-type: none"> 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.
	<p>Physics Earth and Space</p> <ul style="list-style-type: none"> 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. <p>This topic will be accompanied by a trip to Space Port.</p>	<p>Biology Animals including Humans</p> <ul style="list-style-type: none"> describe the changes as humans develop to old age. 	<p>Physics Forces</p> <ul style="list-style-type: none"> 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. <p>This topic will be supported and accompanied by Forest Schools activities once a week for the full half term.</p>	<p>Biology Living Things and their Habitats</p> <ul style="list-style-type: none"> 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 	<p>Chemistry Properties and Changes of Materials</p> <ul style="list-style-type: none"> 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. 	

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 6	<p>Biology Living Things and their Habitats</p> <ul style="list-style-type: none"> 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. <p>This topic will be supported and accompanied by Forest Schools activities once a week for the full half term.</p>	<p>Physics Electricity</p> <ul style="list-style-type: none"> 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. 	<p>Biology Animals including Humans</p> <ul style="list-style-type: none"> 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. 	<p>Physics Light</p> <ul style="list-style-type: none"> recognise that light appears to travel in straight lines <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. 	<p>Biology Evolution and Inheritance</p> <ul style="list-style-type: none"> 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. 	
KS3 (Year 7)	<p>Chemistry Particles</p> <p>The properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure</p> <p>Changes of state in terms of the particle model</p>	<p>Biology Cells, Tissues and Organs</p> <p>Cells as the fundamental unit of living organisms,</p> <p>The functions of the different parts of the cell</p> <p>The similarities and differences between plant and animal cells</p>	<p>Physics Energy</p> <p>Simple machines give bigger force but at the expense of smaller movement (and vice versa): product of force and displacement unchanged</p> <p>Biology Reproduction</p> <p>Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems</p> <p>Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative</p>	<p>Chemistry Chemical Reactions</p> <p>Chemical reactions as the rearrangement of atoms</p> <p>Representing chemical reactions using formulae and using equations</p> <p>Combustion, thermal decomposition, oxidation and displacement reactions</p> <p>Defining acids and alkalis in terms of neutralisation reactions</p> <p>The pH scale for measuring acidity/alkalinity; and indicators</p>	<p>Biology Ecology</p> <p>The interdependence of organisms in an ecosystem, including food webs and insect pollinated crops</p> <p>The importance of plant reproduction through insect pollination in human food security</p> <p>How organisms affect, and are affected by, their environment, including the accumulation of toxic materials</p>	<p>Physics Light and Space</p> <p>The similarities and differences between light waves and waves in matter light waves travelling through a vacuum; speed of light</p>

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
			investigation of some dispersal mechanisms			

Disciplinary knowledge

	Scientific Attitudes & Planning	Measuring & Observing	Recording & Presenting	Analysing & Evaluating
Y1-2	Asking simple questions and recognising that they can be answered in different way	Observing closely, using simple equipment. Performing simple tests.	Gathering and recording data to help in answering questions. Identifying and classifying.	Use their observations and ideas to suggest answers to questions.
Y3-4	Asking relevant questions and using different types of scientific enquiry to answer them. Setting up simple practical enquiries, comparative and fair tests.	Making systematic and careful observations Taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.	Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions. Recording findings using simple, scientific language, drawings, labelled diagrams, keys, bar charts and tables.	Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. Using results to draw simple conclusions, make predictions for new values, suggest improvement and raise further questions. Identifying patterns related to simple scientific ideas and processes. Using straightforward scientific evidence to answer questions.
Y5-6	Planning different types of scientific enquiries to answer questions, including recognizing and controlling variables where necessary. Identifying scientific evidence that has been used to support or refute ideas or arguments.	Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.	Recording data and results of increasing complexity using scientific diagrams and levels, classification keys, tables, scatter graphs, bar and line graphs.	Using test results to make predictions to set up further comparative and fair tests. Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.