Primary Phase Curriculum Map

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 an 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. We also aim to ensure that all pupils see themselves in our curriculum, and our curriculum takes all pupils beyond their immediate experience of the world.

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
All material in the Universe is made of very small particles.	Atoms are the building blocks of all materials, living and non-living. The behaviour of the atoms explains the properties of different materials. Chemical reactions involve rearrangement of atoms in substances to form new substances. Each atom has a nucleus containing neutrons and protons, surrounded by electrons. The opposite electric charges of protons and electrons attract each other, keeping atoms together and accounting for the formation of some compounds.	■ Objects can be distinguished by considering the material it's made from, and describing simple properties (Y1, Uses of Everyday Materials) ■ All the 'stuff' encountered in everyday life, including air, water and different kinds of solid substances is called matter (Y2, Uses of Everyday Materials) ■ Different materials are recognisable by their properties (Y2, Uses of Everyday Materials) ■ The shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2, Uses of Everyday Materials) ■ States of matter: solids, liquid gasses. (Y4, States of Matter) ■ The amount of material does not change when a solid melts or a liquid evaporates (Y4, States of Matter) ■ If a material could be divided into smaller and smaller pieces it would be found to be made of pieces, particles, smaller than can be seen even with a microscope. These particles are not in a material; they are the material (Y4, States of Matter) ■ Simple electrical circuits show the effects and properties of electricity (Y4, Electricity) ■ When some materials combine, they do not change permanently and can be separated again (Y5, Properties and Changes of Materials) ■ Materials can be changed by heating and cooling (Y5, Properties and Changes of Materials) ■ When some materials are combined, they form a new material with different properties to the original materials (Y6, Physical and Chemical Changes) ■ The smallest piece of a material is called an atom. All materials, anywhere in the universe, living and non--living, are made of a very large numbers of these basic 'building blocks' of which there are about 100 different kinds (KS3)
Objects can affect other objects at a distance.	Some objects have an effect on other objects at a distance. In some cases, such as sound and light, the effect is through radiation which travels out from the source to the receiver. In other cases action at a distance is explained in terms of the existence of a field of force between objects, such as a magnetic field or the universal gravitational field.	■ Magnets can attract and repel each other and other materials at a distance ■ (Y3, Forces and Magnets) ■ We need light to see the world around us. Shadows are the absence of light. ■ (Y3, Light) ■ Objects can have an effect on other objects even when they are not in contact with them. Light reaches our eyes, even though the light source may be far away (Y3, Light) ■ Sound comes from things that vibrate and can be detected at a distance from the source because the air or other material around is made to vibrate. Sounds are heard when the vibrations in the air reach our ears (Y4, Sound) ■ The non-contact force of gravity makes things fall to Earth (Y5, Forces) ■ There is gravitational force between all objects, but it is only felt when one or more of the objects has a very large mass (Y5, Forces)

Vertical Concept	Definition	Units
		■ Light travels in straight lines and we see things because light travels from a light source, to objects and then to our eyes. (Y6, Light) ■ There is attraction and repulsion between objects that are electrically charged (KS3) ■ Visible light and other forms of radiation can travel through any empty space (KS3) ■ How quickly an object's motion is changed depends on the force acting and the object's mass. The greater the mass of the object, the longer it takes to speed it up or slow it down (inertia) (KS3) ■ Visible light and other forms of radiation can travel through any empty space (KS3)
Changing the movement of an object requires a net force to be acting on it.	Objects change their velocity of motion only if there is a net force acting on them. Gravity is a universal force of attraction between all objects however large or small, keeping the planets in orbit round the Sun and causing terrestrial objects to fall towards the centre of the Earth.	■ We can compare how different objects move on different surfaces (Y3, Forces and Magnets) ■ Forces can push, pull or twist objects, making them change shape or motion (Y3, Forces and Magnets) ■ Things can only change their motion if there is a net force acting on them (Y3, Forces and Magnets) ■ When forces acting on an object are not equal and opposite in direction, they are unbalanced and will change an object's speed, direction or shape (Y3, Forces and Magnets) ■ Unsupported objects fall towards Earth because of the force of gravity acting between the Earth and the falling object. (Y5, Forces) ■ Air resistance, water resistance and friction act between moving surfaces. (Y5, Forces) ■ Some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. (Y5, Forces) ■ The downward force of gravity on an object on the Moon is less than that on Earth because the Moon has less mass on Earth (Y5, Earth and Space) ■ How quickly an object's motion is changed depends on the force acting and the object's mass. The greater the mass of the object, the longer it takes to speed it up or slow it down (inertia) (KS3)
The total amount of energy in the Universe is always the same but energy can be transformed when things change or are made to happen.	Many processes or events involve changes and require energy to make them happen. Energy can be transferred from one body to another in various ways. In these processes some energy is changed to a form that is less easy to use. Energy cannot be created or destroyed. Energy obtained from fossil fuels is no longer available in a convenient form for use.	Things around us can be made to change or happen. We can pull objects behind us or push them across the table (Y1, Everyday Materials) All living things need food to give them energy (Y2, Living things and their habitats) ■ The arrows in a food chain show where energy is being transferred from and to (Y2, Living things and their habitats) ■ The arrows in a food web show where energy is being transferred from and to (Y4, Food and Digestion) ■ Things around us can be made to change or happen. We can turn on a light bulb and make it brighter or dimmer (Y4, Electricity)

Vertical Concept	Definition	Units
		■ Many processes and phenomena are explained in terms of energy exchanges (Y5, States of Matter) ■ Energy cannot be created or destroyed. When energy is transferred from one object to others, the total amount of energy in the universe remains the same; the amount that one object loses is the same as the other objects gain (Y5, States of Matter) ■ Voltage has an effect on how electrical components function (Y6, Electricity) ■ Across the world, the demand for energy increases as human populations grow and modern lifestyles require more energy, particularly electrical energy (Y6, Electricity) ■ Objects have energy because of their chemical composition, their movement, their temperature, their position in a gravitational or other field, or because of compression or distortion of an elastic material (KS3)
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.	■ Plants grow in soil (Y1, Plants) ■ Seasons have different weathers associated with them (Y1, Seasonal Changes) ■ How the lengths of day and night varies (Y1, Seasonal Changes) ■ The air is all around us on Earth (Y2, Animals) ■ There are different types of rock, they are formed in different ways and have their own, distinct, physical appearances. (Y3, Rocks) ■ Much of the solid surface of the Earth is covered in soil, which is a mixture of pieces of rock of various sizes and the remains of organisms. Some soil also contains air, water and some nutrients (Y3, Rocks) ■ Beneath the Earth's solid crust is a hot layer called the mantle. The Earth's crust consists of a number of solid plates which move relative to each other, carried along by movements of the mantle. The formation of mountains, earthquakes and volcanic activity are likely to occur at these cracks (Geography Year 3 Spring: Mountains and Volcanoes and Year 4 Summer: Earthquakes) ■ There is less and less air further away from the Earth's surface; space is a vacuum (Y5, Earth and Space) ■ The action of water wears down rock gradually into smaller pieces (Geography, Year 5 Spring: Investigating water) ■ Light from the Sun warms the Earth's surface and the heat is trapped by the Earth's air. This is known as the greenhouse effect (Geography, Year 5 Summer: Climate across the world) ■ Weather is determined by conditions of the air. The temperature, pressure, direction and speed of the movement and the amount of water vapour in the air combine to create the weather. (KS3) ■ Radioactive decay of material inside the Earth since it was formed is its internal source of energy (KS3)

Vertical Concept	Definition	Units
Our solar system is a very small part of one of millions of galaxies in the Universe.	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.	■ Daytime is when the Earth is facing the Sun; night-time is when the Earth is facing away from the Sun (Y1, Seasonal Changes) ■ The Moon reflects light from the Sun (Y3, Light) ■ The Earth's rotation results in day and night. (Y5, Earth and Space) ■ Planetary objects move in relation to the sun. (Y5, Earth and Space) ■ Different planets in our solar system have different features (Y5, Earth and Space) ■ The tilt of the Earth's axis gives rise to seasons (KS3) ■ The movements of galaxies suggest that the Universe is expanding from a past state called the 'big bang', towards a future that is still unclear (KS3)
Organisms are organised on a cellular basis.	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.	■ Living things, including humans, react to their surroundings with their senses (Y1, Humans) ■ Living things grow, need, water, air and food, react to their surroundings, move, get rid of their waste, reproduce (Y2, Animals) ■ Humans and some other animals have a skeleton and muscles for support, protection and movement (Y3, Animals, including humans). ■ Living things – organisms – need water, air, food, a way of getting rid of water and an environment that stays within a particular temperature range.(Y3, Plants) ■ Humans have a digestive system that breaks down food so that it can be absorbed by our bodies. (Y4, Animals including humans) ■ The human circulatory system consists of multiple organs carrying out different roles (Y6, Animals including humans) ■ Diet, exercise, drugs and lifestyle impacts the way in which our bodies function (Y6, Animals including humans) ■ Micro-organisms are organisms that are so small that we cannot see them with our eyes alone (Y6, Classification) ■ All living organisms are made of one or more cells, which can only be seen through a microscope (KS3) ■ All the basic functions of life – growth, reproduction, extracting energy from food – are the results of what happens inside cells (KS3) ■ Cells are often aggregated into tissues, tissues into organs, and organs into organ systems (KS3)
Organisms require a supply of energy and materials for which they are often dependent on or in	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	■ There is a wide variety of living things (Y1, Plants) (Y1, Animals) ■ Living things grow, need, water, air and food, react to their surroundings, move, get rid of their waste, reproduce (Y2, Animals) ■ Most plants make their own food (Y2, Living Things & Their Habitats)

Vertical Concept	Definition	Units
competition with other organisms.	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.	■ Animals need food, which comes by eating plants (herbivores) or by eating animals (carnivores), which have eaten plants or other animals. (Y2, Living Things & Their Habitats) ■ Plants and animals are dependent on each other. (Y2, Living Things & Their Habitats) ■ Organisms are adapted to their environment. If conditions in a habitat change, organisms may not be able to survive (Y2, Living Things & Their Habitats) ■ For life and growth, plants need air, light, water, nutrients from soil, and room to grow (Y3, Plants). ■ Plants make their own food using sunlight, carbon dioxide and water (Y3, Plants) ■ Animals, including humans, need the right type of nutrition which they get from the food they eat (Y3, Animals, including humans). ■ The food chain model shows how organisms are reliant on other living things in order to survive (Y4, Animals including humans) ■ A living thing's environment can change and this can pose dangers (Y4, Living things and their habitats) ■ In any given ecosystem there is competition among species for the energy and materials they need to live. (Y6, Evolution) ■ Decomposers are essential (alongside producers and consumers) for a stable ecosystem. (KS3)
Genetic information is passed down from one generation of organisms to another.	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.	■ Plants and animals reproduce (have offspring) (Y2, Plant Growth) ■ The role flowers play in the life cycle of flowering plants include pollination and seed formation (Y3, Plants) ■ Organisms produce offspring of the same kind, but in many cases offspring are not identical with each other or with their parents. (Y5, Lifecycles) ■ Plants and animals, including humans, resemble their parents in many features because information is passed from one generation to the next. (Y5, Lifecycles) ■ Not all information is passed on from one generation to the other in the same way; some skills and behaviour have to be learned (Y5, Lifecycles) ■ Animals reproduce sexually. Some plants reproduce sexually and other can reproduce asexually (Y5, Living things and their habitats) ■ In a human body, most cells contain 23 pairs of chromosomes. These provide information that is needed to make more cells in growth and reproduction (KS3)

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The diversity of organisms, living and extinct, is the result of evolution.	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.	■ There are many kinds of plants and animals in the world today (Y1, Plants) ■ 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) ■ Fossils are the preserved remains or traces of living things (Y3, Rocks) ■ Different plants have different requirements for life and growth (Y3, Plants) ■ Different animals (mammal, an amphibian, an insect and a bird) have different life cycles (Y5, Living things and their habitats) ■ Plants, animals and micro-organisms are classified based on specific characteristics (Y6, Living things and their habitats) ■ There are many kinds of organisms that were once alive but are now extinct. We know about extinct animals from fossils (Y6, Evolution and inheritance) ■ Living things are found in certain environments because they have the features that enable them to survive there. This adaptation to their environment has come about because of the small differences that occur during reproduction, resulting in some individuals being better suited to the environment than others. In the competition for materials and energy, those that are better adapted will survive and are more likely to pass on their adapted feature to their offspring (Y6, Evolution and inheritance) ■ The natural selection of organisms has been going since the first form of life appeared on Earth 3.5 billion years ago (KS3)

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
N3-4	**Seasonal Changes** • Identify appropriate clothes to go outside in different types of weather • We see puddles when it's rainy, shadows during the day and rainbows when there is sunshine and rain • Some animals, like hedgehogs, hibernate in the winter Types of weather include sunny, rainy, windy, snowy • Habitats are the places that living things live • Different animals live in different habitats **Everyday Materials** • Explore natural and man-made materials • Some materials are hard whilst others are soft, some can be described as rough whilst others are smooth, and some are dull whilst others are shiny		**States of Matter** • Melting and freezing can be observed in the world around us **Forces** • How slow/fast a vehicle moves along a track depends on how hard/gently it is pushed/pulled, how steep the slope is, or whether there is an obstacle in its way. **Lifecycles** • Animals look different when they age • Parents and their young animals look similar and different. **Plant Growth** • Plants need water and light to grow **Living Things and their Habitats** • The Serengeti is a grassland, with habitats home to animals. **Humans** • Healthy eating		**Everyday Materials** • Some materials will dissolve in water – making playdough **Lifecycles** • Planting seeds – observing the lifecycle of a plant from the seed/seedling/plant • Life-cycle of butterfly • Insects and their habitats	
Reception	**Everyday Materials** • Comparing things that float and sink **Light** • Sources of light/light and dark		**Seasonal Changes** • Observing the changes of the seasons and the effects of wind • Observing the properties of water and ice **Lifecycles** • Life cycle of a Frog **Plants** • Growing Sunflowers **Everyday Materials** • Making Pancakes – observing changes in materials		**Humans** • Our bodies – understanding why we have a skeleton **Living Things and their Habitats** • Many animals live in water, like turtles, orcas, dolphins, manta rays, sharks, seahorses and jellyfish	
Year 1	**Biology** **Plants** • identify and name a variety of common wild and garden	**Chemistry** **Everyday Materials** • distinguish between an object and the material	**Physics** **Seasonal changes (Autumn to Winter)**	**Physics** **Seasonal changes (Spring to Summer)** • observe changes across the four seasons	**Biology** **Animals** • Naming reptiles, fish, amphibians, birds and mammals;	**Biology** **Humans** • Human body parts and senses

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	plants, including deciduous and evergreen trees • identify and describe the basic structure of a variety of common flowering plants, including trees	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	• observe changes across the four seasons • observe and describe weather associated with the seasons and how day length varies	• observe and describe weather associated with the seasons and how day length varies	carnivores, herbivores, omnivores	
Year 2	**Biology** **Plant Growth** • 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	**Biology** **Needs of Animals** • 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	**Chemistry** **Uses of Everyday Materials** • 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.	**Biology** **Living things & their habitats** • Basic introduction to habitats and micro-habitats, and simple food chains • Everything in the world can be categorised as either alive, used to be alive or has never been alive. • Living things move, reproduce, are sensitive to their surroundings, grow, need oxygen, get rid of their waste, and need nutrition • Animals and plants move	**Chemistry** **Solids, Liquids and gasses** • All materials are made of a single substance or a mixture of substances • There are three states of matter • Substances can exist as solids, liquids and gases • The three states of matter have different properties • We can decide if a substance is in its solid, liquid or gaseous state by looking at its properties • One substance can exist in the different states, when the substance is in a different state it is still the same substance	

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 3	**Chemistry** **Rocks** • 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.	**Physics** **Light** • 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	**Biology** **Animals Including Humans** • 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.	**Biology** **Plants** • 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	**Physics** **Forces and Motion** • ***Introducing pushes and*** pulls***; opposing forces, and balanced forces*** • Forces are pushes or pulls • Forces arise when objects interact with each other • Forces can cause a change in speed, direction or shape of an object • Forces that act in opposite directions are called opposing forces. • We use arrows to show the size of the force and the direction it acts in. • Forces that are equal and act in opposite directions are described as balanced forces, • When forces are balanced, an object will move at a constant speed in the same direction. • Unbalanced forces can change the shape of an object.	**Physics** **Forces and Magnetism** • 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.

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
					• Friction is a force between two surfaces that are sliding or trying to slide over each other	
Year 4	**Biology** **Classifying Organisms** • 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.	**Biology** **Food and Digestion** • 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.	**Chemistry** **Particle model and states of matter** • the different substances in their different forms (solids, liquids and gases) are all made of particles • the particles in the different states of matter are arranged differently • investigate the effect of temperature on the rate of evaporation • 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	**Physics** **Sound** • 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.	**Physics** **Electricity** • 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	**Chemistry** **Properties of materials** • Physical properties are properties that we can measure or observe in the classroom • Physical properties include electrical conductivity; melting and boiling points; thermal conductivity; being malleable; windproof; hard/soft; and magnetic • Energy will be transferred from places with a higher temperature to places with a lower temperature. • Elasticity is a physical property. Elastic materials can stretch and then return to its original form. • Chemical properties are properties that scientists need specialist equipment to measure

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
			water cycle and associate the rate of evaporation with temperature.		being good conductors.	• Chemical properties include how easy a substance is to set on fire (flammability) or how poisonous something is (toxicity)
Year 5	**Chemistry** **Separating Mixtures** • 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	**Biology, Chemistry, Physics** **Energy** • Energy is needed by both living and non-living things. • Energy can be transferred from one store to another store • Fossil fuels and batteries are examples of chemical energy stores • Energy resources such as oil, gas and coal can be depleted. • Energy stores are needed for something to happen • When energy is removed from one store and is transferred to another store, the amount of energy in the first store	Biology **Life Cycles** • 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	**Biology** **Animals including Humans** • describe the changes as humans develop to old age. • The human life cycle goes through the same stages as those for other animals: fertilisation, gestation, growth • Fertilisation in most humans is internal, but it can happen externally (in vitro fertilisation - IVF - which means 'in glass' fertilisation) • The human life cycle: embryo, foetus, infant, child, adolescent, adult, senior • Human are viviparous and a foetus develops inside the mother (or surrogate mother) • The bigger the animal, the longer the gestation period	**Physics** **Forces** • 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.	**Physics** **Earth and Space** • 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.

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	• 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.	goes down and the amount of energy in the second store goes up • Energy is not used up it is just moved around from store to store. • Energy can be stored thermally in the surroundings		• A foetus is considered a baby when it is born • Cognitive, physical and social and emotional development takes place at the greatest rate during infancy		
Year 6	**Physics** **Electricity** • 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	**Biology** **Evolution and Inheritance** • recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth	**Physics** **Light** • 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	**Biology** **Further Classification** • describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including	**Biology** **Functions of the human body** • 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,	**Chemistry** **Physical and chemical changes** • *Identifying physical and* chemical changes • A mixture is two or more substances that are mixed but not chemically joined together • Distillation is a separating technique

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	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.	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.	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.	microorganisms, plants and animals • give reasons for classifying plants and animals based on specific characteristics.	drugs and lifestyle on the way their bodies function • describe the ways in which nutrients and water are transported within animals, including humans.	that can separate a solvent from a solution. It relies on evaporation and condensation. • Chromatography is a separation technique in which a mixture is dissolved into a solvent, and the components of the mixture are carried by the solvents at different rates. • A chemical change is a change where a new substance is formed. • A physical change is where the substance changes its properties, but it does not become a different substance • Some chemical changes are irreversible, but some can be reversed • Most physical changes are reversible but some are not • Chemical reactions can be summarized using word equations. • Word equations show the names of the chemicals reacting and the names of the products formed.

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
KS3 (Year 7)	**Chemistry** **Particles** • The properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure • Changes of state in terms of the particle mode	**Biology** **Cells, Tissues and Organs** • Cells as the fundamental unit of living organisms, • The functions of the different parts of the cell • The similarities and differences between plant and animal cells	**Physics** **Energy** • Simple machines give bigger force but at the expense of smaller movement (and vice versa): product of force and displacement unchanged **Biology** **Reproduction** • Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems • Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms	**Chemistry** **Chemical Reactions** • Chemical reactions as the rearrangement of atoms • Representing chemical reactions using formulae and using equations • Combustion, thermal decomposition, oxidation and displacement reactions • Defining acids and alkalis in terms of neutralisation reactions • The pH scale for measuring acidity/alkalinity; and indicators	**Biology** **Ecology** • The interdependence of organisms in an ecosystem, including food webs and insect pollinated crops • The importance of plant reproduction through insect pollination in human food security • How organisms affect, and are affected by, their environment, including the accumulation of toxic materials	**Physics** **Light and Space** • The similarities and differences between light waves and waves in matter • light waves travelling through a vacuum; speed of light

	Scientific Attitudes & Planning	Measuring & Observing	Recording & Presenting	Analyzing & Evaluating
EYFS	• Show curiosity about objects, events and people • Engage in open-ended activity • Take a risk, engage in new experiences and learn by trial and error • Find ways to solve problems/ find new ways to do things/ test their ideas • Develop ideas of grouping, sequences, cause and effect	• Closely observe what animals, people and vehicles do • Use senses to explore the world around them • Comments on aspects of the familiar world • Handle equipment and tools effectively	• Create simple representations of events, people and objects • Develop their own narratives and explanations by connecting ideas or events • Build up vocabulary that reflects the breadth of their experiences	• Answer how and why questions about their experiences
Y1	• Scientists look for patterns in the world around them • Scientists group objects or living things based on their properties • It is important that we keep as much as we can the same, apart from the one thing we measure and the one thing we change • Scientists conduct secondary research to learn from what other scientists have already learned	• Gather information from text/ books/ images	• Record numerical or descriptive observations in a table • Draw a diagram, a simple scientific drawing that explains or informs • Use a table to classify items based on properties • Use a Carroll diagram to classify items based on properties • Use a Venn diagram to classify items into two or three sets based on properties	• Make simple statements about the results of an enquiry
Y2	• Make a prediction based on substantive knowledge • There are four main stages of enquiry • Scientists identify potential hazards in their experiments and plan ways to reduce them • Scientists conduct investigations to identify whether a pattern they think they've seen is really there	• Make systematic observations of an object • Observe using a magnifying glass safely	• Use a pair of axes to classify items based on the extent it displays two properties	• Ask further questions that could be explored to extend findings

Y3	• Select most appropriate equipment to measure (the variables) that will give you the best chance of an accurate result • A dependent variable is what you measure; an independent variable is what you change; controlled variables are things that stay the same • Scientists identify factors in an investigation that should be controlled, and try to find ways to control them • Write an appropriate method • Science is studied as three disciplines: biology (study of living organisms), chemistry (study of materials) and physics (study of energy)	• Gather information from the internet • Anomalous results should be discarded and rerecorded • Data is repeatable if the same person repeats the investigation and gets the same results; data is reproducible if the investigation is repeated by a different person and the results are the same • Taking multiple readings allows you to see if your data is repeatable, and helps identify outliers	• Design a table to collect data with the appropriate number of rows and columns and correct headings	• Draw conclusions (e.g. 'the greater the… , the greater the…') • Use scientific understanding to explain their findings • Suggest ways to improve practical procedures to obtain more accurate measurements • Use findings of investigation to make further predictions
Y4	• Set a hypothesis to test • Draw diagram of the investigation • Scientists use models to help explain their ideas	• Gather information using a data logger (e.g. sound meter app; heart rate app)	• Use a classification key to identify an object • Draw a dichotomous classification key to help others identify an object • Present information orally using a prop or demonstration • Present information in a written format	• Identify scientific evidence that has been used to support or refute ideas •
Y5	• Science is studied as three disciplines: biology (study of living organisms), chemistry (study of properties of matter and how it interacts with energy) and physics (study of energy) • Scientists look for patterns in data to try to identify correlations • Scientists must work out if the factor is the cause of the outcome in a correlation	• Measure force using a Newtonmeter •	• Scatter graphs can help you decide if there is a relationship between two variables • Interpret and construct climate graph • Line graphs can be used when data is continuous; bar charts can be used when data is discrete	• Make judgements on the reliability of the data • Some people may agree or disagree with the use of some scientific discoveries • Science is never 'complete' and scientists are always working to make models more accurate or to discover new explanations

Y6		• Taking multiple readings allows you to see if your data is repeatable, helps identify outliers and allows a mean to be calculated	• Decide which graph is most appropriate for the enquiry	• Calculating the mean can be used as a method of analysing data
KS3	• Evaluate risks	• Pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility • Use a wider range of apparatus and techniques • Apply sampling techniques • Evaluate data, showing awareness of potential sources of random and systematic error	• Use a range of graph types to display data, including pie charts, scatter graphs and line graphs	• The difference between correlation and causation, and suggesting ways to test for both • Understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review