



# SCIENCE

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Leader: Tausif Lorgat

## TMET curriculum intent

“We will provide all of our children with a **broad, relevant** and **enriched** curriculum so that they have the **character** to make a **positive** contribution to our society and are **knowledgeable, skilled and ready** for the next phase of their education.”



### BROAD, RELEVANT & ENRICHED

The Science curriculum is broad, relevant and enriched by linking topics to the big questions in our sticky curriculum, linking science to real life situations and adopting the five enquiry types within lessons. Examples of this can be seen in science floor books and on the school Twitter feed.



### DEVELOPS CHARACTER

The Science curriculum by incorporating Questions for Learning, which develops curiosity. Practical lessons develops resilience within science. Examples of this can be seen in science floor books.



### POSITIVE CONTRIBUTION

The Science curriculum provides a positive contribution by incorporating science-based activities into the curiosity area of homework as well as inviting science-based visitors into school.



### KNOWLEDGEABLE, SKILLED & READY

The Science curriculum creates knowledgeable and skilled students by using the five enquiry types. Examples of this can be seen on the school Twitter feed and in science floor books.

As a scientist- Biology: Plants		
Prior knowledge	Knowledge in year 1	Subject Specific
	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	Common wild plants, garden, plants, tree, deciduous, evergreen, trunk, branches, leaf, roots, bud, flowers, petal, stem, fruit, vegetables, bulb, seed, bark, stalk
	<p style="text-align: center;">Skills in year 1</p> Make close <b>observations</b> of leaves, seeds, flowers etc. <b>Compare</b> two leaves, seeds, flowers etc. <b>Classify</b> leaves, seeds, flowers etc. using a range of characteristics <b>Identify</b> plants by matching them to named images <b>Make observations</b> of how plants change over a period of time When further afield, spot plants that are the same as those in the local area studied regularly and <b>describe</b> the key features that helped them <b>Ask questions</b> about plants and trees in their local environment	

As a scientist- Chemistry: Everyday materials		
Prior knowledge	Knowledge in year 1	Subject Specific
	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	Object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card/ cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see through, not see through
	<p style="text-align: center;">Skills in year 1</p> <b>Classify</b> objects made of one material in different ways e.g. a group of object made of metal <b>Classify</b> in different ways one type of object made from a range of materials e.g. a collection of spoons made of different materials <b>Classify</b> materials based on their properties <b>Test</b> the properties of objects e.g. absorbency of cloths, strength of party hats made of different papers, stiffness of paper plates, waterproofness of shelters and record the results <b>Ask questions</b> about everyday materials	

As a scientist- Biology: Living things and their habitats		
Prior knowledge	Knowledge in year 2	Subject Specific
	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 micro-habitats Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food	Living, dead, never been alive, suited, suitable, basic needs, food, food chain, shelter, move, feed, names of local habitats e.g. pond, woodland etc., names of micro-habitats e.g. under logs, in bushes etc
	<p style="text-align: center;">Skills in year 2</p> <b>Explore</b> the outside environment regularly to find objects that are living, dead and have never lived <b>Classify</b> objects found in the local environment <b>Observe</b> animals and plants carefully, drawing and labelling diagrams <b>Construct</b> simple food chains for a familiar local habitat from first hand observation and research Create simple food chains from information <b>using secondary resources</b> e.g. in picture books (Gruffalo etc.)	

As a scientist- Biology: Animals (including humans)		
Prior knowledge	Knowledge in year 1	Subject Specific
	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 basic body parts and identify which part of the body is associated with senses	Senses, touch, see, smell, taste, hear, fingers (skin), eyes, nose, ear and tongue Head, body, eyes, ears, mouth, teeth, leg, tail, wing, claw, fin, scales, feathers, fur, beak, paws, hooves
	<p style="text-align: center;">Skills in year 1</p> Make first hand <b>close observations</b> of animals from each of the groups <b>Compare</b> two animals from the same or different group <b>Classify</b> animals using a range of features e.g. by what they eat <b>Identify</b> animals by matching them to named images Make first hand <b>close observations</b> of parts of the body e.g. hands, eyes <b>Compare</b> two people by <b>looking for patterns</b> between them <b>Record</b> measurements of parts of their body <b>Compare</b> parts of their own body <b>Classify</b> people according to their features <b>Investigate</b> human senses e.g. which part of my body is good for feeling, which is not?	

As a scientist- Seasonal changes		
Prior knowledge	Knowledge in year 1	Subject Specific
	Observe changes across the four seasons Observe and describe weather associated with the seasons and how day length varies	Weather (sunny, rainy, windy, snowy etc.), seasons (Winter, Summer, Spring, Autumn), sun, sunrise, sunset, day length
	<p style="text-align: center;">Skills in year 1</p> <b>Record</b> information about the weather regularly throughout the year <b>Present</b> this information in table and charts to compare the weather across the seasons <b>Collect information</b> , regularly throughout the year, of features that change with the seasons e.g. plants, animals, humans <b>Present</b> this information in different ways to compare the seasons <b>Gather data</b> about day length regularly throughout the year and present this to compare the seasons	

As a scientist- Physics: Everyday materials		
Prior knowledge (Y1)	Knowledge in year 2	Subject Specific
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	Object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card/ cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see through, not see through, opaque, transparent and translucent, reflective, non-reflective, flexible, rigid Shape, push/pushing, pull/pulling, twist/twisting, squash/squashing. Bend/bending, stretch/stretching
	<p style="text-align: center;">Skills in year 2</p> <b>Classify</b> materials <b>Use secondary resources</b> to research and make suggestions about alternative materials for a purpose that are both suitable and unsuitable <b>Test</b> the properties of materials for particular uses e.g. compare the stretchiness of fabrics to select the most appropriate for Elastigirl's costume, test materials for waterproofness to select the most appropriate for a rain hat	

As a scientist- Biology: Animals (including humans)		
Prior knowledge (Y1)	Knowledge in year 2	Subject specific vocabulary
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 basic body parts and identify which part of the body is associated with senses	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	Offspring, reproduction, growth, child, young/old stages (examples - chick/hen, baby/child/adult, caterpillar/butterfly), exercise, heartbeat, breathing, hygiene, germs, disease, food types (examples – meat, fish, vegetables, bread, rice, pasta)
	Skills in year 2 <b>Ask people questions and use secondary</b> sources to find out about the life cycles of some animals <b>Observe</b> animals growing over a period of time e.g. chicks, caterpillars, a baby <b>Ask questions</b> of a parent about how they look after their baby <b>Ask pet owners</b> questions about how they look after their pet <b>Conduct simple tests</b> to explore the effect of exercise on their bodies <b>Classify</b> food in a range of ways, including using the Eatwell guide <b>Investigate</b> washing hands, using glitter gel	

As a scientist- Biology: Animals (including humans)		
Prior knowledge (Y2)	Knowledge in year 3	Subject specific vocabulary
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.	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.	Nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, support, protect, move, skull, ribs, spine, muscles, joints
	Skills in year 3 <b>Classify</b> food in a range of ways <b>Research</b> the nutritional content of a range of food items using food labels <b>Use secondary</b> sources to find out they types of food that contain the different nutrients Use food labels to <b>ask and answer enquiry questions</b> e.g. How much fat do different types of pizza contain? How much sugar is in soft drinks? Plan a daily diet contain a good balance of nutrients <b>Explore</b> the nutrients contained in fast food <b>Use secondary sources</b> to research the parts and functions of the skeleton <b>Investigate pattern seeking</b> questions such as ‘can people with longer legs run faster?’ <b>Compare, contrast and classify</b> skeletons of different animals	

As a scientist- Physics: Light		
Prior knowledge	Knowledge in year 3	Subject specific vocabulary
	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.	Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous
	Skills in year 3 <b>Create simple experiments</b> and use results to <b>make conclusion</b> e.g. to explore how different objects are more or less visible in different levels of lighting, explore how objects with different surfaces e.g. shiny vs matt are more or less visible <b>Gather and record</b> data in a variety of ways by exploring how shadows vary as the distance between a light source, an object or surface is changed <b>Identify similarities, differences and changes</b> when exploring shadows which are connected to and disconnected from the object e.g. shadows of clouds and children in the playground <b>Use scientific evidence</b> to choose suitable materials to make shadow puppets	

As a scientist- Biology: Plants		
Prior knowledge (Y1)	Knowledge in year 2	Subject specific vocabulary
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	Common wild plants, garden, plants, tree, deciduous, evergreen, trunk, branches, leaf, roots, bud, flowers, petal, stem, fruit, vegetables, bulb, seed, bark, stalk, light, shade, sun, warm, cool, water, grow, healthy
	Skills in year 2 <b>Make close observations</b> of seeds and bulbs <b>Classify</b> seeds and bulbs <b>Research and plan</b> when and how to plant a range of seeds and bulbs <b>using secondary resources</b> Look after the plants as they grow – weeding, thinning, watering etc. <b>Make close observations</b> and <b>record</b> measurements of their plants growing from seeds and bulbs <b>Make comparisons</b> between plants as they grow	

As a scientist- Physics: Forces		
Prior knowledge	Knowledge in year 3	Subject specific vocabulary
	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.	Force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole
	Skills in year 3 <b>Conduct simple investigations</b> to explore how objects move on different surfaces e.g. spinning tops/coins, rolling balls/cars, and use the results to <b>make conclusions</b> <b>Explore</b> what materials are attracted to a magnet and apply the results to <b>make predictions</b> <b>Classify</b> materials according to whether they are magnetic <b>Explore</b> the way that magnets behave in relation to each other and how they work at a distance, <b>recording results</b> in a variety of ways Use a marked magnet to find the unmarked poles on other types of magnets <b>Devise an investigation</b> to test the strength of magnets	

As a scientist- Chemistry: Rocks		
Prior Knowledge	Knowledge in year 3	Subject specific vocabulary
	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.	Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil, igneous, metamorphic, sedimentary, limestone, sandstone, pumice, quartz
	Skills in year 3 <b>Observe</b> rocks and soil closely <b>Classify</b> rocks in a range of ways based on their appearance and use the results to <b>make predictions</b> for future investigations <b>Devise a test</b> to investigate the hardness and water absorption of a range of rocks, <b>recording results</b> in a variety of ways <b>Observe</b> how rocks change over time e.g. gravestones or old building <b>Research using secondary sources</b> how fossils are formed <b>Classify</b> soils in a range of ways based on their appearance <b>Devise a test</b> to investigate the water retention of soils and <b>make simple conclusions</b> <b>Observe</b> how soil can be separated through sedimentation <b>Research</b> the work of Mary Anning	

As a scientist- Biology: Plants		
Prior knowledge (Y2)	Knowledge in Year 3	Subject specific vocabulary
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.	Photosynthesis, pollen, insect/wind pollination, seed formation, seed dispersal – wind dispersal, animal dispersal, water dispersal
	<p style="text-align: center;">Skills in Year 3</p> <p><b>Observe</b> what happens to plants over time when the leaves or roots are removed and use results to <b>make conclusions</b> <b>Make predictions and observe</b> the effect of putting cut white carnations or celery in coloured water <b>Create investigations</b> to test what happens to plants when they are put in different conditions e.g. in darkness, in the cold, deprived of air, different types of soil, different fertilisers, varying amount of space Spot flowers, seeds, berries and fruits outside throughout the year and <b>observe</b> flowers being visited by pollinators e.g. bees and butterflies in the summer <b>Observe</b> flowers carefully to identify the pollen <b>Observe</b> seeds being blown from the trees e.g. sycamore seeds <b>Use secondary resources</b> to research different types of seed dispersal <b>Classify</b> seeds in a range of ways including by how they are dispersed to <b>find patterns</b> Create a new species of flowering plant</p>	

As a scientist- Biology: Animals (including humans)		
Prior knowledge (Y3)	Knowledge in year 4	Subject specific vocabulary
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	Digestive system, digestion, mouth, teeth, saliva, oesophagus, stomach, small intestine, nutrients, large intestine, rectum, anus, teeth, incisor, canine, molar, premolars, herbivore, carnivore, omnivore, producer, predator, prey, food chain
	<p style="text-align: center;">Skills in year 4</p> <p><b>Research</b> the function of the parts of the digestive system <b>Create</b> models/ annotated diagrams/ detailed descriptions using IT of the digestive system <b>Explore</b> eating different types of food, to identify which teeth are being used for cutting, tearing and grinding (chewing) <b>Classify</b> animals as herbivores, carnivores or omnivores according to the type of teeth they have in their skulls Use food chains to identify producers, predators and prey within a habitat and <b>explore patterns found</b> Use <b>secondary sources</b> to identify animals in a habitat and find out what they eat</p>	

As a scientist- Physics: Electricity		
Prior Knowledge	Knowledge in year 4	Subject specific vocabulary
	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	Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol
	<p style="text-align: center;">Skills in year 4</p> <p><b>Construct</b> a range of circuits <b>Explore</b> which materials can be used instead of wires to make a circuit using <b>comparative and fair testing</b> <b>Classify</b> the materials that were suitable/not suitable for wires to <b>find patterns</b> <b>Explore</b> how to connect a range of different switches and <b>investigate</b> how they function in different ways <b>Use results from earlier tests to choose</b> switches to add to circuits to solve particular problems such as a pressure switch for a burglar alarm <b>Apply their knowledge</b> of conductors and insulators to design and make different types of switch <b>Make</b> circuits that can be controlled as part of a D&amp;T project</p>	

As a scientist- Biology: Living things and their habitats		
Prior knowledge (Y2)	Knowledge in year 4	Subject specific vocabulary
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 micro-habitats Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food	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	Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate
	<p style="text-align: center;">Skills in year 4</p> <p><b>Observe</b> plants and animals in different habitats throughout the year <b>Compare and contrast</b> the living things observed <b>Use classification keys</b> to name unknown living things <b>Classify</b> living things found in different habitats based on their features to <b>find patterns</b> <b>Create</b> a simple identification key based on observable features Use fieldwork to <b>explore</b> human impact on the local environment e.g. litter, tree planting <b>Use secondary sources</b> to find out about how environments may naturally change <b>Use secondary sources</b> to find out about human impact, both positive and negative, on environments</p>	

As a scientist- Physics: Sound		
Prior knowledge	Knowledge in year 4	Subject specific vocabulary
	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	Sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation
	<p style="text-align: center;">Skills in year 4</p> <p><b>Classify</b> sound sources and use results to <b>make predictions</b> <b>Explore</b> making sounds with a range of objects such as musical instruments and other household objects to <b>answer questions</b> <b>Explore</b> how string telephones or ear gongs work <b>Explore</b> using objects that change in feature to change pitch and volume such as length of guitar string, bottles of water or tuning forks Measure sounds over different distances and <b>record results</b> in a variety of ways</p>	

As a scientist- Chemistry: States of matter		
Prior knowledge	Knowledge in Year 4	Subject specific vocabulary
	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	Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle
	<p style="text-align: center;">Skills in Year 4</p> <p><b>Observe</b> closely and classify a range of solids and liquids and <b>record the results in a variety of ways</b> Explore making gases visible <b>using practical enquiries</b> e.g. squeezing sponges under water to see bubbles, and showing their effect e.g. using straws to blow objects, trees moving in the wind <b>Classify</b> materials according to whether they are solids, liquids and gases to <b>find patterns</b> <b>Make predictions and observe</b> a range of materials melting and freezing e.g. ice, chocolate, butter, shampoo <b>Investigate</b> how to melt ice more quickly Observe the changes when making rocky road cakes or ice-cream Investigating melting point of different materials e.g. ice, margarine, butter and chocolate <b>Make predictions and observe</b> water evaporating and condensing e.g. on cups of icy water and hot water Use a thermometer to <b>measure and record</b> temperatures e.g. icy water (melting), tap water, hot water, boiling water (demonstration) <b>Set up investigations</b> to explore changing the rate of evaporation e.g. washing, puddles, handprints on paper towels, liquids in containers <b>Use secondary sources</b> to find out about the water cycle</p>	

As a scientist- Biology: Living things and their habitats		
Prior knowledge (Y4)	Knowledge in year 5	Subject specific vocabulary
<p>Recognise that living things can be grouped in a variety of ways</p> <p>Explore and use classification keys to help Group, identify and name a variety of living things in their local and wider environment</p> <p>recognise that environments can change and that this can sometimes pose dangers to living things</p>	<p>Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird</p> <p>Describe the life process of reproduction in some plants and animals</p>	<p>Life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis, asexual, plantlets, runners, bulbs, cuttings</p>
	<p>Use <b>secondary sources</b> and, where possible, first hand <b>observations</b> to find out about the life cycle of a range of animals</p> <p><b>Compare</b> the gestation times for mammals and <b>look for patterns</b> e.g. in relation to size of animal or length of dependency after birth</p> <p><b>Look for patterns</b> between the size of an animal and its expected life span</p> <p><b>Grow and observe</b> plants that reproduce asexually e.g. strawberries, spider plant, potatoes</p> <p><b>Take cuttings</b> from a range of plants e.g. African violet, mint</p> <p><b>Plant bulbs</b> and then harvest to see how they multiply, use findings to <b>make conclusions</b></p> <p><b>Use secondary sources</b> to find out about pollination</p>	
As a scientist- Chemistry: Properties and changes of materials		
Prior knowledge (Y4)	Knowledge in year 5	Subject specific vocabulary
<p>Compare and group materials together, according to whether they are solids, liquids or gases</p> <p>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)</p> <p>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature</p>	<p>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</p> <p>Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</p> <p>Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating</p> <p>Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic</p> <p>Demonstrate that dissolving, mixing and changes of state are reversible changes</p> <p>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</p>	<p>Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve reversible/non-reversible change, burning, rusting, new material</p>
	<p><b>Investigate</b> the properties of different materials in order to recommend materials for particular functions depending on these properties e.g. test waterproofness and thermal insulation to identify a suitable fabric for a coat</p> <p><b>Explore</b> adding a range of solids to water and other liquids e.g. cooking oil, as appropriate and <b>report results of the enquiry</b></p> <p><b>Investigate</b> rates of dissolving by carrying out <b>comparative and fair test</b></p> <p><b>Separate mixtures</b> by sieving, filtering and evaporation, choosing the most suitable method and equipment for each mixture</p> <p><b>Make predictions and</b> explore a range of non-reversible changes e.g. rusting, adding fizzy tablets to water, burning</p> <p><b>Carry out comparative and fair tests</b> involving non-reversible changes e.g. What affects the rate of rusting? What affects the amount of gas produced?</p> <p><b>Research</b> new materials produced by chemists e.g. Spencer Silver (glue of sticky notes) and</p>	
As a scientist- Physics: Earth and Space		
Prior Knowledge	Knowledge in year 5	Subject specific vocabulary
	<p>Describe the movement of the Earth, and other planets, relative to the Sun in the solar system</p> <p>Describe the movement of the Moon relative to the Earth</p> <p>Describe the Sun, Earth and Moon as approximately spherical bodies</p> <p>Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky</p>	<p>Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune) spherical, solar system, rotates, star, orbit, planets, dwarf planets, Pluto, Eris, Ceres, geocentric model, heliocentric model, shadow clocks, sundials, astronomical clocks</p>
	<p>Use <b>secondary sources</b> to help create a model e.g. role play or using balls, to show the movement of the Earth around the Sun and the Moon around the Earth.</p> <p>Use <b>secondary sources</b> to help make a model to show why day and night occur</p> <p><b>Make first-hand observations</b> of how shadows caused by the Sun change through the day</p> <p><b>Make predictions</b> and produce a sundial to test those predictions</p> <p><b>Research</b> time zones</p> <p><b>Consider the views of scientists in the past and</b> evidence used to deduce shapes and movements of the Earth, Moon and planets before space travel</p>	

As a scientist- Biology: Animals (including humans)		
Prior knowledge (Y4)	Knowledge in year 5	Subject specific vocabulary
<p>Describe the simple functions of the basic parts of the digestive system in humans</p> <p>Identify the different types of teeth in humans and their simple functions</p> <p>construct and Interpret a variety of food chains, identifying producers, predators and prey</p>	<p>describe the changes as humans develop to old age</p>	<p>Foetus, Embryo, Womb, Gestation, Baby, Toddler, Teenager, Elderly, Growth, Development, Puberty</p>
	<p>Lessons will be taught through puberty topic</p>	
As a scientist- Physics: Forces		
Prior Knowledge (Y3)	Knowledge in year 5	Subject specific vocabulary
<p>Compare how things move on different surfaces</p> <p>Notice that some forces need contact between two objects, but magnetic forces can act at a distance</p> <p>Observe how magnets attract or repel each other and attract some materials and not others</p> <p>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</p> <p>Describe magnets as having two poles</p> <p>predict whether two magnets will attract or repel each other, depending on which poles are facing.</p>	<p>Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object</p> <p>Identify the effects of air resistance, water resistance and friction, that act between moving surfaces</p> <p>Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect</p>	<p>Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears</p>
	<p><b>Plan a variety of tests</b> to investigate the effect of friction in a range of contexts e.g. trainers, bath mats, mats for a helter-skelter</p> <p><b>Investigate</b> the effects of water resistance in a range of contexts e.g. dropping shapes through water, pulling shapes e.g. boats along the surface of water and <b>record results</b> of increasing complexity</p> <p><b>Investigate</b> the effects of air resistance in a range of contexts e.g. parachutes, spinners, sails on boats and use the results to <b>set up further comparative and fair tests</b></p> <p><b>Explore</b> how levers, pulleys and gears work</p> <p><b>Make</b> a product that involves a lever, pulley or gear</p> <p><b>Create</b> a timer that uses gravity to move a ball</p> <p><b>Research</b> how the work of scientists such as Galileo Galilei and Isaac Newton helped to develop the theory of gravitation</p>	
As a scientist- Physics: Light		
Prior Knowledge (Y3)	Knowledge in year 6	Subject specific vocabulary
<p>Recognise that they need light in order to see things and that dark is the absence of light</p> <p>Notice that light is reflected from surfaces</p> <p>Recognise that light from the sun can be dangerous and that there are ways to protect their eyes</p> <p>Recognise that shadows are formed when the light from a light source is blocked by an opaque object</p> <p>find patterns in the way that the size of shadows change</p>	<p>Recognise that light appears to travel in straight lines</p> <p>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</p> <p>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</p> <p>Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them</p>	<p>Lens, iris, cornea, eyeball, contract, dilate, pupil, optic nerve, brain, waves, lines, reflection, refraction, frequency, spectrum, shadows, light source, reversed.</p>
	<p><b>Explore</b> different ways to demonstrate that light travels in straight lines e.g. shining a torch down a bent and straight hose pipe, shining a torch through different shaped holes in card</p> <p><b>Explore</b> the uses of the behaviour of light, reflection and shadows such as in periscope design, rear view mirrors and shadow puppets.</p> <p>Design investigations using <b>comparative and fair testing</b> to test the behaviour of light, reflection and shadows.</p>	



# SCIENCE

## Building knowledge team

Champions: J smith and A McKee

Leader: Tausif Lorgat

Kestrel Mead curriculum intent

*To ignite a passion for knowledge (resilience), an inquisitive eye (curiosity) a confident voice (respect) and a global citizen (compassion)*

As a scientist- Biology: Inheritance and evolution		
Prior knowledge	Knowledge in year 6	Subject specific vocabulary
	<p>Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago</p> <p>Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents</p> <p>Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution</p>	<p>Offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils</p>
	Skills in year 6	
	<p><b>Design</b> a new plant or animal to live in a particular habitat</p> <p><b>Use models</b> to demonstrate evolution e.g. Darwin's finches bird beak activity</p> <p><b>Use secondary sources</b> to find out about how the population of peppered moths changed during the industrial revolution</p> <p><b>Make observations</b> of fossils to identify living things that lived on Earth millions of years ago</p> <p><b>Identify</b> features in animals and plants that are passed on to offspring</p> <p><b>Explore</b> this process by considering the artificial breeding of animals or plants e.g. dogs</p> <p><b>Compare</b> the ideas of Charles Darwin and Alfred Wallace on evolution to <b>support or refute ideas and arguments</b></p> <p><b>Research</b> the work of Charles Darwin and how this provided evidence of evolution</p>	

As a scientist- Biology: Animals (including humans)		
Prior knowledge (Y5)	Knowledge in year 6	Subject specific vocabulary
<p>describe the changes as humans develop to old age</p>	<p>Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood</p> <p>Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function</p> <p>Describe the ways in which nutrients and water are transported within animals, including humans</p>	<p>Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs and lifestyle</p>
	Skills in year 6	
	<p><b>Create a role play model</b> for the circulatory system</p> <p><b>Carry out a range of investigations and record results with increasing accuracy</b></p> <p><b>Fair test</b> – effect of different activities on my pulse rate</p> <p><b>Pattern seeking</b> – exploring which groups of people may have higher or lower resting pulse rates</p> <p><b>Observation over time</b> - how long does it take my pulse rate to return to my resting pulse rate (recovery rate)</p> <p><b>Pattern seeking</b> – exploring recovery rate for different groups of people</p> <p><b>Use secondary resources</b> to learn about the impact of exercise, diet, drugs and lifestyle on the body.</p> <p><b>Use secondary resources</b> to learn about the sections of the heart</p>	

# COVERAGE

## Big questions, key concepts and awe, wonder and reciprocity

	Big question/unit title	Key concepts list	Awe, wonder and reciprocity
1	<p>What are the four seasons?</p> <p>How am I similar to other animals in the world?</p> <p>Can I describe all the plants around me?</p> <p>How can everyday materials be grouped?</p>	<p>Seasonal changes</p> <p>Biology: Animals including humans</p> <p>Biology: Plants</p> <p>Chemistry: Everyday materials</p>	
2	<p>How do animals survive together?</p> <p>How can I grown into the best version of me?</p> <p>How can we help plants to grow?</p> <p>How can I use everyday materials to survive?</p>	<p>Biology: Living things and their habitats</p> <p>Biology: Animals including humans</p> <p>Biology: Plants</p> <p>Physics: Everyday materials</p>	<p>Campout survival at school (How can I used everyday materials to survive?)</p>
3	<p>What do I need to survive?</p> <p>Why do some materials attract and others repel?</p> <p>How vital al are bees for the survival of plants?</p> <p>What is the difference between light and dark?</p> <p>Why do we have different types of rocks?</p>	<p>Biology: Animals including humans</p> <p>Biology: Plants</p> <p>Physics: Light</p> <p>Chemistry: Rocks</p>	<p>Natural History Museum London.</p>



## CHALLENGE FOR ALL

The science curriculum ensures that all children are provided with high expectations and encourages them to set themselves inspiring aspirations, as well as developing their confidence and ability to achieve this. Children will be provided with scaffolding and support as well as further challenge, as and when appropriate, ensuring their differing needs are met. The curriculum offers a 'no ceilings' approach, meaning that children are all accessing similar work. This allows children who are working at a range of levels in order subjects, to have opportunities to excel, foster their talents and develop their skills and knowledge. The science curriculum adopts an enquiry style approach, where children are encouraged to work collaboratively, allowing children to support each other, as well as working practically thus supporting all learners. Children are also challenged with a 'MrStretch' challenge, meaning that they have to apply their science knowledge to solve problems.



## ASSESSMENT AND REPORTING

Each topic within the science curriculum includes a pre and post learning mind map, where children write their prior knowledge about the next topic in one colour and return to this in a different colour, adding their new learning. This forms part of the summative assessment as well as allowing teachers to see the knowledge that they are beginning with, allowing them to determine which children will need more support in terms of knowledge and understanding and which will need stretching further. At the end of each topic, teachers will carry out a focussed assessment, whereby all children complete a practical assessment in order for teachers to be able to assess their understanding. Teachers will also continue to use formative assessment to inform individual lessons, ensuring that they will be adapted to meet the needs of all learners, as well as ensuring that challenge is always provided.



## SCIENCE

### Building knowledge team

**Champions: J Smith and A McKee**

**Leader: Tausif Lorgat**

Kestrel Mead curriculum intent

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As a scientist- Physics: Electricity		
Prior knowledge (Y4)	Knowledge in year 6	Subject specific vocabulary
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  <b>Skills in year 6</b> <b>Explain</b> how a circuit operates to achieve particular operations, such as control the light for a torch with different brightness or make a motor go faster or slower <b>Make circuits</b> to solve particular problems such as a quiet and a loud burglar alarm <b>Carry out fair tests</b> exploring changes in circuits <b>Make circuits</b> that can be controlled as part of a D&T project	Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage

As a scientist- Biology: Living things and their habitats		
Prior Knowledge (Y5)	Knowledge in year 6	Subject specific vocabulary
Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird Describe the life process of reproduction in some plants and animals	Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals Give reasons for classifying plants and animals based on specific characteristics  <b>Skills in year 6</b> Use <b>secondary sources</b> to learn about the formal classification system devised by Carl Linnaeus and why it is important Use first hand <b>observation</b> to identify characteristics shared by the animals in a group and <b>find patterns</b> Use <b>secondary sources</b> to research the characteristics of animals that belong to a group <b>Use information</b> about the characteristics of an unknown animal or plant <b>to assign it to a group</b> <b>Classify</b> plants and animals <b>presenting this in a range of</b> ways – Venn diagrams, Carroll diagrams and keys <b>Create</b> an imaginary animal which has features from one or more groups	Vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering and non-flowering

## COVERAGE

### Big questions, key concepts and awe, wonder and reciprocity

	Big question/unit title	Key concepts list	Awe, wonder and reciprocity
4	How can a change in environment cause problems? What happens to the food we eat? Can electricity actually run? Why do we have different sounds? What effect does temperature have on the world around us?	Chemistry: States of matter Biology: Animals including humans Physics: Electricity Physics: Sound Chemistry: States of matter	Rutland Water.
5	How do we experience day and night? How do forces affect us? What happens to our bodies as we grow? Are all actions reversible? What is a life cycle?	Physics: Earth and space Physics: Forces Biology: Animals including humans Chemistry: Properties and changes of materials Biology: Animals including humans	Gardening. Residential trip to Derbyshire
6	Why do our hearts need to beat? Can all living things be classified? Can animals adapt to survive the changing world? Do we need light to see? How does a light switch work?	Biology: Animals including humans Biology: Living things and their habitats Biology: Inheritance and evolutions Physics: Light Physics: Electricity	



### CHALLENGE FOR ALL

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### ASSESSMENT AND REPORTING

Each topic within the science curriculum includes a pre and post learning mind map, where children write their prior knowledge about the next topic in one colour and return to this in a different colour, adding their new learning. This forms part of the summative assessment as well as allowing teachers to see the knowledge that they are beginning with, allowing them to determine which children will need more support in terms of knowledge and understanding and which will need stretching further. At the end of each topic, teachers will carry out a focussed assessment, whereby all children complete a practical assessment in order for teachers to be able to assess their understanding. Teachers will also continue to use formative assessment to inform individual lessons, ensuring that they will be adapted to meet the needs of all learners, as well as ensuring that challenge is always provided.



## SCIENCE

### Evaluation, action plan and policy

Champions: J Smith and A McKee

Leader: Tausif Lorgat



### HOW THIS IS TAUGHT

In KS2, science is taught weekly for one hour on a Wednesday morning. In KS1 this varies between classes.

It is taught as a stand alone topic. However, there are links to afternoon topics with questions assigned to each topic for cross reference to be made.

An enquiry based approach is adopted across all year groups and children apply their Working Scientifically objectives throughout this approach.

Each year group follows the National Curriculum topics and objectives.



### VARIANTS AND REASON

Every year group has a weekly timetabled slot for a Science lesson and this should be followed each week. In KS2, this is on a Wednesday morning, in year KS1 this varies between classes.

### Evaluation of subject against OFSTED – Quality of Education

#### Curriculum intent

There is a clear long term plan for Science which outlines the progression in knowledge and vocabulary. Some topic titles are repeated in later years but clear National Curriculum objectives outline progression within these. In the long term plan there are also examples to help the different enquiry types to be taught. The long term plan also outlines prior knowledge to further ensure progression.

The skills and knowledge for each year group is clear. The working scientifically objectives for each phase are taught within the five enquiry types (observing over time, pattern seeking, research, fair and comparative testing and identifying and classifying).

Teachers have the freedom to spend as many weeks as they need to ensure complete coverage. There is no a set timeline of topic lengths due to a differing number of objectives in each topic. Each year group has a maximum of five topics to be completed across the six half terms.

Assessment points/clear end points have been discussed in a recent CPD and will be monitored throughout the year. During the summer term of 2022, subject champions delivered CPD on focussed assessment and expectations around recordings in science and floor books. Focussed assessments will be implemented in Autumn 1, subject champions will be monitoring the usage of these throughout the year. All staff (except new NQT's attended). These focussed assessment sheets, will enable children to verbally discuss the key concepts learnt for that particular unit of work. The impact of this means that assessment will be clearer and more concise for all staff who attended, which will ultimately lead to a truer reflection of where the children are in terms expected or at working towards working scientifically and meeting the national curriculum objectives

#### Curriculum implementation

Science is being taught explicitly in a weekly timetabled lessons. Teachers plan in year groups of 4, so subject knowledge should be addressed through these teams. Teachers have previously been signposted to how they can improve their own subject knowledge, should they need to do so, however this information will need to be redistributed for NQTs and new starters.

An area for development is for us, is to ensure teachers are adhering to the scheme of work/curriculum plan, especially where topic titles are repeated in later year groups. Teachers should be using the five scientific enquiry types, and this should be seen in planning, which was addressed in a summer CPD session in 2022.

By monitoring class floor books and learning walks, we should be able to attain how clearly teachers present information and promote discussion. Furthermore, through pupil interviews we will be able to see how effective teachers are at embedding key concepts and if students are able to use subject specific vocabulary.

Teacher assessment is an area for development for this academic year, with teachers using focussed assessments.

We will also be addressing how science is implemented in the EYFS curriculum where we will be conducting research and working closely with the EYFS lead, in preparation of developing our EYFS curriculum .

#### Curriculum impact

Floor book scrutinies have identified the progress of a class collectively, however does not show individual progress within the subject– this has been identified as an area for development across both buildings. This year we would like to see a range of work in Science floor books from all different pupils, showcasing their learning journey.

Over the past two years, the profile of science, the quality of teaching and the frequency of science lessons have increased, meaning children are becoming more prepared for their next stage of education, however this is an ongoing area of development.

### Evaluation of subject against OFSTED – Leadership and Management

The science long term plan clearly identifies prior knowledge for each area of science and clearly displays the objectives needed to be taught by each year group. The five enquiry types are detailed in the skills section of the plan.

The science resource cupboard was heavily resourced last year in line with curriculum objectives to ensure at least 2 classes out of 4 can partake in Science lessons. Floor books are being used to allow children to work collaboratively in science and to reduce the amount of formal written science work produced. This is also helped to reduce teacher workload in terms of marking. Planning is not required in a specific format, but should include the five enquiry types. Feedback is taken on board from all stakeholders, which is reflected upon when reviewing and adding to the action plan.

We will also be addressing how science is implemented in the EYFS curriculum where we will be conducting research and working closely with the EYFS lead, in preparation of developing our EYFS curriculum .

#### Subject Improvement Plan 2022-23

1. To monitor the coverage and progression in science throughout the school ensuring high quality outcomes for pupils.
2. To implement and monitor use of assessment in Science.
3. To develop subject knowledge of subject champions in order to provide high quality teaching across the school.

(Subject action plans outline actions, timelines, desired impacts and ongoing evaluation)

## SUBJECT DEEP DIVE

### QUESTIONS FOR REFLECTION

What is the purpose of teaching XX?

What does XX look like in your school?

How do you organise your XX curriculum?

How do you ensure progression is evident in XX?

Does your XX curriculum match or exceed the national curriculum?

How do you ensure XX is sequenced in each year group?

How do you ensure pupils acquire their knowledge of XX taught across the school?

Can you show me what XX looks like in years 2, 4 and 6? Can you explain the sequence of lessons?

What aspects of the curriculum do your children find difficult? How do you overcome these difficulties?

How do you organise/ personalise your curriculum for your disadvantaged and SEND children?

## KEY QUOTES

“Knowledge is the torch which illuminates the world,” Louis Pasteur.

“Nothing in life is to be feared, it is only to be understood. Now is the time to understand more so that we may fear less,” Marie Curie.