The Elms Primary Schools

Long Term Plan 2025-26

SUBJECT: Science

Vision: For children to show a passion for science and a curiosity for learning about the world around them through an exciting, engaging and challenging curriculum.

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Pre-School	**Marvellous me** **The children begin to make sense of who they are.** • What do I look like? • How do I look different now? • Who is in my family? • How do we use our senses? • How do we smell/taste/see/touch/hear? **The children will begin to understand and notice the changes in the season of Autumn/Winter.** • What is the weather like? • What can you see outside? • Celebrating Harvest. **What happens in the day and the night?** **The children begin to make sense of the world around them.** • What animals do we see in the day/night? • What changes do we notice in the day/night? • What makes dark and light? • What do we know about space? • Where is the sun/moon? • Can we explore the planets? • How can we get to space?		**Let's look at toys!** **The children begin to explore how things work and move.** • Have you got a favourite toy? • What makes a good toy? • What are toys made from? • How does it work? • How do moving toys work? **Take a look at Spring!** **The children will begin to understand and notice the changes in the season Spring.** • What is the weather like? • What can you see outside? • How do we look after the outdoors?		**What happens in the garden?** **The children begin to make sense of the world around them.** • What is growing in the garden? • What amazing creatures can we see outside? • Where do they live? • How do living things change and grow? **Going on a Journey** **The children begin to explore their own home and community. They continue their journey by looking at seaside's as well as people who help us.** • Where do I live? • Where do you like to go? • What can I see at the seaside? • How can we look after the ocean? **Take a look at Summer!** **The children will begin to understand and notice the changes in the season of Summer.** • What is the weather like? • What can you see outside?	
Key Vocabulary	before, now, change, different, same, live, smell, touch, taste, see, hear weather, hot, cold, rain, wind, sunny, leaves, red, orange, brown, yellow, green space, sun, moon, stars, planets, day, night, light, dark		toy, movement, remote-control, push, pull, press, slide, roll weather, hot, cold, rain, wind, sunny, flowers, plants, blossom		grow, garden, plants, seed, flowers, leaf, minibeasts, names: spider, woodlouse, slug, snail, worms, lif-cycle summer, sunny, warm, hot home, Faringdon, map, seaside, ocean, sand, animals and their names	
Working scientifically	Science, experiment, find out, fair, explain, reason, why, change					
SMSC	Spiritual – What is special about life. To know more and to wonder about the world. To wonder about the vastness of space. Moral – To become increasingly curious. Social – Working together.		Spiritual – To know more and to wonder about the world. To look at the world in awe and wonder. Moral – To become increasingly curious. Consider the environment. Social – Group practical work. Teamwork and taking responsibility.		Spiritual – To know more and to wonder about the world. To look at the world in awe and wonder. Moral – To become increasingly curious. Consider the environment. Social – Group practical work. Teamwork and taking responsibility.	
Cultural Capital	Understanding the World – British science week – World science day – Poster competition – Harwell Science – Baking - Seasons walk around school -					
Reception	**Who am I?** **The children look at photos of themselves as babies and describe how they have changed. They look at who is in their family including those they do not live with.**		**Where in the world?** **The children taste, explore and describe foods from around the world.** • What fruits can you name? • Can you name the fruit?		**How does your garden grow?** **The children will explore what they can see outside, they will describe what they can see and find out how things grow.** • What is a minibeast?	

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	• How have I changed? • Who is in my family? (beyond who they live with). • What are our senses? • How do we use them? **The children will notice the changes in the season of Autumn.** • What is the weather like? • What can you see outside? • How have things changed? • What colours can you see? • What clothes do we wear? **<u>How do we change food?</u>** **The children will explore food through their senses. They will explore how certain foods can be changed.** • What can we smell/taste/see/feel? • What happens to chocolate when we heat it up? • How does porridge change when we heat it up? – The Three Bears. • What happens to ingredients when we mix them together? – Gingerbread Men.	• How does it taste? • What is your favourite one? • What is the same? • What is different? **The children will notice the changes in the weather.** • What is the weather like? • What can you see outside? • How have things changed? • What colours can you see? • What clothes do we wear? **<u>How does the weather affect animals?</u>** **The children will look at and discuss hot and cold climates. They will explore how change can affect animals and the environment.** • How does the weather affect animals and where they live? • How can we look after our environment? **<u>How do we get around?</u>** **The children will explore different types of transport and talk about how transport has changed.** • What types of transport do you know? • How has transport changed? • Can we compare old and new transport? • What makes them go? **<u>How do we keep healthy?</u>** **The children will begin to understand what helps us to keep healthy. Linked to Jigsaw.** • Why do we need to exercise? • Why is moving good for our bodies? • Which foods are healthy? • Why is it important to wash our hands? • Why is sleep good for us?	• What can you find in the garden? • Where do minibeasts live? • Can we make a minibeast home? • What is the life cycle of a butterfly? • How do flowers grow? **<u>Where does the water in puddles go?</u>** **The children will find out where water comes from and look at the water cycle.** • Where does water come from? • What is the water cycle? • What is water used for? • What floats and what sinks?
Key Vocabulary	family, senses, taste, smell, hear, see, touch weather, seasons change, melt, liquid, hard, heat, mix	names of fruit, taste, smell, feel, describe, sweet, sour, bitter, salty, like, dislike weather, seasons animals, hot, cold, environment, affect, change transport, movement exercise, healthy, hygiene	minibeasts, habitat, life-cycle, plant, flower, leaf, bulb, seed water cycle, float, sink, health, hygiene
Working scientifically	Science, experiment, find out, fair, explain, reason, why, change, describe, identify, compare, observe		

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SMSC	Spiritual – What is special about life. To know more and to wonder about the world. Moral – To become increasingly curious. Social – Working together.	Spiritual – To know more and to wonder about the world. To look at the world in awe and wonder. Moral – To become increasingly curious. Consider the environment. Social – Group practical work. Teamwork and taking responsibility.	Spiritual – To know more and to wonder about the world. To look at the world in awe and wonder. Moral – To become increasingly curious. Consider the environment. Social – Group practical work. Teamwork and taking responsibility.
Cultural Capital	Understanding the World – Around the world party – Observe our caterpillars grow – Mobile farm – British science week – World science day – Visit to church, library and fire station – Cooking: baking and fruit tasting – Poster competition – Harwell Science.		
Year 1	**<u>Why are different materials important?</u>** 1. **What is Science?** 2. **Why does the weather change?** 3. **What are materials and how can we group them?** (objects are made from different materials such as wood/plastic/glass/metal/fabric, explore simple properties like rough/smooth/shiny/soft/hard/bendy, sort based on materials e.g. metal spoons/wooden chairs/plastic bottles.) 4. **What happens when we bend or stretch different materials?** (observe what happens when we bend/stretch/squash + identify which change shape easily) 5. **Why do we use some materials for certain objects?** (Everyday uses of materials e.g. why plastic is used for water bottles or wood for furniture, understanding importance of materials in making everyday objects e.g., clothes/toys/tools) Planting tulips - October **<u>How does winter affect living things and how we stay safe?</u>** 1. **Do trees die in the winter?** (Even though tress lose their leaves, they are not dying. Deciduous and evergreen) 2. **Do all animals like living outside in the cold?** (Not all animals like living in the cold. Weather gets colder and see snow in winter – some burrow/den/roost, some have fat reserves/thick fur etc.) 3. **What different objects could we use to see in the dark?** ("Can't you sleep, Little Bear? – book focus for experiment – if wanted!) 4. **Is there more night in the winter than in the summer?** (days are shorter and nights are longer in winter – gets darker earlier) 5. **How do we keep safe when it is darker?** (lights on bikes/reflective strips on coats/warmer clothes/lights on cars) 6. **How do nocturnal animals stay safe at night in low light?** (Animals are awake at night to be safe from predators/temperature/easier to sneak up on prey. Adaptations in dark – cats - night vision/chameleons - change colour & regulate body temp/owls – big eyes/bats – big ears to compensate for sight/moles – great sense of smell)	**<u>How can materials help us make safe and exciting journeys?</u>** 1. **What is the best material for a toy car?** (Different materials have unique properties. Strong, smooth, and lightweight materials help toy cars to move quickly & safely. Certain materials are better for specific parts e.g., wheels (rolling smoothly) and bodies (durable but light) 2. **Which materials would be best for building a tall bus?** (Some materials are strong and sturdy (e.g., metal) for holding up tall structures – need to support weight and resist bending or breaking. Certain materials are used for certain purposes e.g., glass for windows.) 3. **Which materials help us to float in water?** (Materials have different properties related to floating/sinking. Lightweight, buoyant materials (e.g., foam/rubber) help keep objects afloat. Some materials e.g., foam, are chosen for boats and life vests because of their waterproof and buoyant properties) 4. **What is the best way to cross a river?** (Materials can be used to make things float – waterproof, stable materials are ideal for water travel. Boats (wood/metals) or rafts (plastic/rubber) are used for safe river crossings. Bridges are another form of crossing – even though some bridges are made of strong materials, their shape made them unstable. Some shapes are stronger than others e.g., triangles) 5. **What is it like to live in space?** (Objects fall to the ground because of gravity. Space has a lack of gravity so the objects float. Some jobs i.e., eating, sleeping, washing your hair can be difficult if you were staying at the International Space Station) 6. **How can we come back to Earth safely?** (Rockets are made out of metal. Using all knowledge so far, design something to keep an egg safe when they jump out of a "plane") **<u>Which animals live near us and how can we help to take care of them?</u>** 1. **How do we know if an animal is a bird?** (Feathers, beaks, wings, lay eggs, hollow bones, (usually) lives in a nest) 2. **What do birds eat?** (Seeds, berries, fruit, insects, eggs, worms, slugs, mealworms etc. Bird feeders put outside will encourage birds to visit) 3. **How can we identify common British birds?** (Big Garden Bird Watch, observe birds outside, RSPB bird book – Blue Tit, Chaffinch, Blackbird, Magpie – most likely to see so learn features of these) 4. **Which animals live in the woods?**	**<u>How do animals survive and thrive in the rainforest?</u>** 1. **Are rainforests and British woods the same?** (Rainforests are found in warm, wet, tropical regions, while British woods are in temperate (mild) climates with changing seasons. Rainforests have a hot, humid climate, while British woods have cooler temperatures and distinct seasons. Rainforests are home to tall trees with dense canopies, while British woods often have shorter trees and open spaces. Animals in rainforests include monkeys, toucans, and jaguars, while British woods have animals like foxes, badgers, and squirrels.) 2. **What types of animals live in the rainforests?** A wide variety including mammals (monkeys, sloths, jaguars), birds (parrots, toucans), reptiles (snakes, chameleons), amphibians (poison dart frogs). Animals have adaptations to help them survive, such as camouflage, climbing abilities, or brightly coloured markings to warn predators.) 3. **Why do some animals have tails?** (Tails serve different purposes for different animals. Monkeys use their tails for **balance** when climbing. Dogs wag their tails to **show emotions**. Lizards use their tails to **distract predators or defend themselves**. Fish and whales use their tails for **swimming**. Some animals, like spider monkeys, have tails **to grab and hold onto branches**.) 4. **Why do some animals have claws?** (Claws help animals survive. They are used for **hunting** (predators like tigers and eagles use claws to catch prey). They are used for **climbing** (squirrels and slots use their claws to climb trees). They are used for **digging** (moles and armadillos use their claws to dig for food or burrows). They are used for **defense** (cats or bears use their claws to protect themselves).) 5. **Can we group animals by what they eat?** Animals can be grouped by their diets. Herbivores (eat plants – cows, deer, parrots). Carnivores (eat meat – lions, snakes, hawks). Omnivores (eat both – bears, foxes, chickens). Teeth and other physical traits can indicate what an animal eats. Herbivores – flat teeth for grinding plants, carnivores – sharp teeth for tearing meat, omnivores – combination of sharp and flat. **<u>How do plants, animals, and the weather change with the seasons?</u>** 1. **What are the different parts of a plant called?**

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		(Badger, deer, fox, kingfisher, otter, rabbit, bat, dormouse, pine martin, squirrel, birds e.g., woodpecker, treecreeper, redwing, jay, blackcap.) 5. **How can we see where animals in the woods have been?** (Most animals are scared of humans so will hide, many woodland animals are crepuscular – active at dawn/dusk – or nocturnal so are often asleep when we visit. BUT we can see evidence of them in their footprints) 6. **Do we need to look after wild animals?** (The more we understand/appreciate nature, the more likely we are to look after it. Wild animals are not pets, so do not need looking after in the same way, but there are still things we can do to help them survive.)	(Roots anchor the plant and absorb water and nutrients from the soil. Stem supports the plant and transports water and nutrients. Leaves make food for the plant through photosynthesis. Flowers help the plant reproduce by making seeds. Seeds grow into new plants.) 2. **Are all leaves the same?** Leaves can vary in shape, size, texture and colour depending on the type of plant. Some leaves are broad and flat, while others are thin and needle-like. Leaves may have different edges – smooth, jagged, or wavy. 3. **Can I investigate a specific question?** (e.g., "Do plants grow taller with more water?" or "what happens to leaves when they are in the dark?". Children ask questions, which they can then practice measuring, comparing, and recording their results.) 4. **Have you ever eaten a flower?** (Some flowers are edible and safe to eat e.g., nasturtiums, courgetti flowers and marigolds. Many fruit and veg come from plants' flowers (e.g. broccoli is a flower). Some flowers should not be eaten as they can be poisonous (e.g., daffodils).) 5. **Does the number of minibeasts change between summer and winter?** (The number and activity of minibeasts are influenced by the seasons. In summer, more minibeasts are active because of warmer weather and abundant food. In winter, many minibeasts hibernate, die, or become less active due to cold temperatures.) 6. **Is it always sunny in the summer?** (Summer generally has warmer weather and longer days, but it is not always sunny. Rain can still occur in summer, and weather patterns vary by location.)
Key Vocabulary	Material, object, texture, hard, soft, rough, smooth, flexible, rigid, strong, weak Stretch, bend, squash, compare, group, shiny, dull, heavy, light Season, autumn, temperature Light, safe, dark, dim, reflect, shiny, thick Builb, tree, flower, plant	Material, property, wood, plastic, metal, glass, fabric, paper, rock. Hard, soft, strong, weak, waterproof, float, sink, durable, lightweight Bridge, boat, raft, space, gravity, safety, parachute Bird, feathers, beak, wings, eggs, nest, flight, seeds, insects, worms, berries, carnivore, herbivore, omnivore, sparrow, robin, blackbird, blue tit, magpie, beak shape, feather pattern, size, song, woodland, mammal, reptile, amphibian, predator, prey, habitat, fox, deer, hedgehog, squirrel, owl, tracks, footprints, droppings, nest, burrow, claw marks, scat, fur, conservation, shelter, protection, endangered, responsibility, wildlife	Rainforest, British woods, habitat, climate, canopy, adaptation, survival, mammals (monkey, jaguar, sloth), birds (parrot, toucan), reptiles (snake, chameleon), amphibian (frog), insects (ant, butterfly), tail, claws, camouflage, balance, climbing, defence, herbivore, carnivore, omnivore, prey, predator, teeth Plant, root, stem, leaf, flower, seed, petal, fruit, bud, grow, absorb, water, soil, nutrient, minibeast, insect, spider, bug, habitat, hibernate, season, spring, summer, autumn, winter, sunny, cloudy, rainy, windy, temperature, daylight, weather
Common misconceptions	**Materials** Confusing objects and materials Assuming materials only have one use All materials are solid All metals are hard and heavy If it's shiny, it's a metal Properties cannot change	**Materials** All hard materials are strong All waterproof materials float Materials have the same properties in all situations Heavy objects always sink All lightweight materials float Astronauts live in space in the same way as they would on Earth	**Animals** All forests are the same Rainforests are only hot and sunny All rainforest animals are dangerous All rainforest animals live in trees Tails and claws are only for defence All animals with tails can hang from them

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	If it's flexible, it's soft Being transparent means an object is colourless **Winter** Trees die in the winter All animals enjoy the cold All objects will help to see in the dark Day and night are the same length all year round Staying inside is the only way to stay safe in the dark Nocturnal animals are at danger at night because it's dark	Parachutes slow objects because they are heavy **Animals** All birds can fly All birds build nests All birds eat seeds All birds that look similar are the same species Woodland animals only live in the woods You can only see animals in the daytime Wild animals do not need help from humans	All animals eat only one type of food Carnivores only eat large prey **Plants** Plants only grow in the summer All flowers are safe All plants grow from seeds All leaves are green Leaves only help plants breathe Minibeasts die in the winter There are no minibeasts in cities It is always sunny in summer and snowy in winter All days in summer are longer than in winter Experiments always give the "right" answer Only adults can ask good scientific questions
Working scientifically	Identify, record,		
SMSC	Spiritual – To know more and to wonder about the world. To look at the world in awe and wonder. Moral – To become increasingly curious. Consider the environment. Be open minded to the suggestion of others. Social – Group practical work. Teamwork and taking responsibility. Taking responsibility for their own and other people's safety. Begin to understand that science effects our lives. Cultural – Begin to understand scientific discoveries by men and women in many cultures. Begin to understand how the environment and science are linked.		
Cultural Capital	Trip to museum – dinosaurs. Science fair Walk around Faringdon – plants. British science week and World science day. Poster competition – Harwell Science.		
Year 2	**How do we choose the best material for different jobs?** 1. **What are materials, and what are objects made from?** (identify & name variety of everyday materials) 2. **How can we describe the properties of different materials?** (explore properties e.g., hardness/flexibility/transparency/waterproof/absorbent) 3. **How can we compare and group different materials?** (grouping based on properties & understanding different materials are suited for different uses) 4. **Which materials are best for building and why?** (Considering materials used in construction + why materials e.g., bricks/metal are better suited to building. 5. **How can materials change shape?** (identify how materials can be bent/twisted/stretched/squashed & identify reversible/irreversible changes) 6. **Why do we choose different materials for different jobs?** (properties of materials make them suitable for particular uses e.g., glass for windows/rubber for tires) **How can we keep ourselves and others healthy?**	**How can we solve problems by choosing the right materials?** 1. **What makes chocolate melt faster or slower?** (adding things to chocolate (e.g., hundreds and thousands, sugar coatings etc.) slows down the melting process. Investigate how we can make chocolate melt without an oven/microwave – solar melting/hand heat/radiators/warm water bath) 2. **How can we find out which material is best for Mr. Wonka to mix his liquid chocolate with?** (Plan experiment – working scientifically. Children choose a variety of materials and plan how they will investigate this question) 3. **Which material should Mr. Wonka use to mix his liquid chocolate?** (Conduct experiment – working scientifically. Children conduct experiments that they planned. Wood – chocolate might stick, metal – conducts heat, plastic – might melt, silicone – heat resistant, flexible, non-stick) 4. **What properties do plastics and rubbers have?** (Lightweight, waterproof, strong, (sometimes) flexible, durable, stretchy, soft. These properties sometimes mean that the product is not good for people or the environment (e.g., Mr. Wonka's bubble gum). 5. **Are plastics bad for the environment?** (Some positives – useful and lasts a long time. Some negatives – does not go away easily, can harm animals, and makes the world messy. Research re bubble/chewing gum – is Mr. Wonka correct?)	**How can we explore and protect the animals and habitats around us?** 1. **How does a tadpole change over time?** (A tadpole's lifecycle involves metamorphosis. Frogs lay eggs (frogspawn) in water, a tadpole hatches from the egg and breathes using gills. Their back legs begin to grow, and then their front legs. It develops lungs and begins to breathe air, and their tail shortens. It is an adult when it is fully formed, leaves the water and lives on land – near water. Frogs are amphibians which means they live in water and on land during different stages of their life.) 2. **What animals are native to British woodlands and gardens, and how can we identify them?** (Mammals (hedgehogs, squirrels, foxes, and badgers), birds (robins, blackbirds, woodpeckers, and owls), insects (ladybirds, bees, butterflies, and beetles) and amphibians (frogs, toads, and newts). Identification involves observing – looking at the size and shape, its body structure, and features, its colour and markings, whether it has feathers, fur or scales, and its habitat and behaviour.) 3. **What types of animals can we find at school, and why is it hard to find some of them?** (Common animals include insects (ants, worms, bees) and birds (sparrows, crows). Animals are hard to find because some are nocturnal (e.g., hedgehogs) and are only active at night. Others are

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	1. **What is healthy?** (not just linked to healthy food, what other healthy choices can we make) 2. **What different foods do we need?** (Eatwell plate – food substitutes, why do we need each food group?) 3. **Do all animals eat the same?** (research – opportunity for expert visit?) 4. **Do animals need to stay fit?** (Some animals need to stay fit to hunt prey/escape predators, some need energy to grow, some need to reproduce) 5. **How can we keep fit?** (Physical lesson – exercise is not just going for a walk or a run, other ways of staying fit & healthy. Do these make you feel just as tired after?) 6. **What happens to germs if I do not wash my hands?** (What are germs/bacteria? Glitter experiment to show transfer. How do we get rid of bacteria? How does our body prevent germs from entering? – nasal hair etc.)	6. **Why do scientists look for new ways to do things?** (Scientists working to create chewing gum that is not made of plastic/rubber. Look at scientist – Dr Raquel Prado – and then objects from everyday life – have they been improved from the first version of them and how? E.g., first telephone to present) **<u>What do living things need to grow?</u>** **1. Do all plants have seeds and where can we find them?** (Most plants grow from seeds, but some grow from bulbs, spores, or cuttings. Seeds are often found inside fruits or flowers. Seeds can vary in size, shape, and appearance depending on plant) **2. How can we help our seeds grow?** (Seeds need specific conditions to grow into healthy plants e.g., water, light, the right temperature, and sometimes soil. Removing obstacles e.g., weeds or pests can help them grow better. Adding nutrients (e.g., compost/fertiliser) to soil can improve growth.) **3. What do seeds need to grow into healthy plants?** (Seeds require – the right amount of water, warmth, light, and air. Seeds that lack even one of these, will not grow or will grow poorly.) **4. Can we follow instructions to grow seeds?** (Following step-by-step method ensures seeds are planted at the right depth, watered appropriately, and placed in correct environment. Consistency in watering, light exposure and temperature is essential. Observing growth over time helps identify what works and what does not.) **5. How can we match baby animals to their parents?** (Baby animals often share physical features with their parents – e.g., fur colour, body shape. Some baby animals look different from their parents at birth – e.g., tadpoles and frogs. Mammals often look identical to parents.) **6. How does a chosen factor affect how humans grow?** (Children to choose a factor to investigate whether it affects human growth – plan and investigate)	camouflaged and blend into their surroundings. Many like to hide in places like soil, trees, or bushes to avoid predators.) **4. What is a food chain?** (A food chain shows how energy is passed from one organism to another. Key parts include the producer (plants that make their own food using sunlight e.g., grass), the consumer (the animal who eat the plants or other animals – herbivores/omnivores/carnivores), the predator (an animal that hunts other animals for food), and the prey (an animal that starts with a plant and ends with a predator).) **5. Are there any animals that usually live in our local areas that we did not find?** (Some animals may be absent due to seasonal changes (hibernation during winter), habitat loss or lack of food sources, or pollution/human activity affecting their populations. Some animals are likely present but not seen, e.g., nocturnal creatures like bats and owls.) **6. Can we create a garden model to encourage wildlife to live there?** (Features of a wildlife-friendly garden include food sources (plants for bees/butterflies, seeds for birds), shelter (log piles for insects, hedgehog houses, bird boxes), water sources (small pond or water dish for frogs, birds, and insects) and native plants (local plants that animals rely on for food/shelter) Gardens help animals to survive and thrive in urban or school environments). **<u>How do living things survive and thrive in extreme habitats around the world?</u>** **1. What do living things need to stay alive?** (Living things need air, water, food, and a suitable habitat to survive. Animals need shelter to protect them and space to find food and water. Plants need sunlight, water, air (carbon dioxide), and nutrients from the soil to grow. All living things must adapt to their environment to meet their basic needs.) **2. How do we know that plants are living things?** (Plants share the same characteristics as other living things: they grow and change over time, they reproduce by producing seeds or spores, they respond to their environment (e.g., sunflowers turn toward the sun). They need air, water, sunlight, and nutrients to survive.) **3. Can living things survive in really hot places?** (Some living things, such as desert animals and plants, have special adaptations to survive extreme heat. E.g., camels store fat in their humps for energy and can go without water for long periods, desert plants (like cacti) store water in their stems. Animals and plants must find ways to stay cool or conserve water.) **4. How do different animals survive in the desert?** (Desert animals have adaptations to survive with little water and high temperatures. Camels – long eyelashes protect their eyes from sand, and wide feet stop them from sinking into the sand. Fennec foxes – large ears help them stay cool by releasing heat. Lizards –

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			thick, scaly skin reduces water loss. Animals are often nocturnal – they are active at night when it is cooler.) 5. **What do plants that live in hot places have in common?** (Plants in hot places have adaptations to store water and reduce water loss. Cacti – thick stems store water, and spines reduce evaporation. Aloe vera – stores water in its leaves. Many plants have deep roots to find water underground. Waxy coatings on leaves help keep moisture inside.) 6. **Why don't penguins freeze when they swim in icy water?** (Penguins have special adaptations to survive in cold environments. Thick feathers trap air to insulate their bodies. A layer of blubber keeps them warm in icy water. Waterproof feathers keep water away from their skin. Penguins huddle together in groups to share warmth.)
Key Vocabulary	Material, object, property, compare, group, sort, job, use Transparent, opaque, absorbent, flexible, brittle, similarities, differences, durable, strong, waterproof, lightweight, insulator, builder, construction Suitability, function, purpose, adapt, design, practical Baby, toddler, child, teenager, adult Shelter, nutrition, hygiene, germs, bacteria, air Carbohydrate, protein	Properties, melting Squash, bend, twist, stretch, firm, force Lightweight, waterproof, flexible, durable, soft Melt, heat, fragile, plastic Seed, bulb, spore, fruit, flower, Soil, compost, fertiliser, light, shade, warmth, nutrients Temperature, energy	Habitat, native, wildlife, environment, ecosystem, conservation, adaptation, biodiversity, lifecycle, amphibian, mammal, bird, insect, tadpole, froglet, metamorphosis, nocturnal, camouflage, food chain, producer, consumer, predator, prey, energy, herbivore, omnivore, carnivore, shelter, water source, log pile, nesting box, wildflowers, Habitat, environment, adaptation, survival, extreme, needs, cactus, stem, roots, leaves, water storage, nutrients, sunlight, penguin, blubber, fur, feathers, camouflage, nocturnal, predator, prey, desert, climate, weather, temperature
Common misconceptions	**Materials** All solids are hard, and all liquids are runny Materials are objects Metal is only used to make hard, shiny objects Plastic is always soft and bendy Only natural materials are "real" – e.g. wood is real, plastic isn't Transparent materials are invisible Objects can only be made from one material Materials cannot change **Health** Healthy foods are only fruits and vegetables All fat is bad for you You can only stay healthy by exercising If I take vitamins, I don't need to eat healthily Sugary drinks are hydrating and part of a healthy diet Brushing my teeth is enough to keep them healthy All germs are bad As long as I wash my hands **sometimes,** it's okay You only need sleep if you're tired Healthy people don't get sick	**Materials** All materials are fabrics Chocolate always melts at the same speed Chocolate melts faster in the sun because the sun is hotter than other heat sources The best material is the strongest one Metal is always the best material for kitchen use Material doesn't matter because chocolate is soft All plastics and rubbers are stretchy All plastics are waterproof All plastic is harmful Plastics take forever to break down Scientists only look for new materials because the old ones are bad Scientists always know the best solution immediately **Growth** All plants grow from seeds Seeds are always visible and large Fruits are the only places where seeds can be found Seeds only need water to grow Overwatering is helpful for plants Seeds grow faster in darkness Seeds "eat" soil to grow Plants can grow without light Seeds will grow anywhere (e.g. if thrown on the ground)	**Habitats** Animals can live in any habitat if there is space All animals live in the same habitat year-round Tadpoles are not frogs All animals have the same lifecycle Food chains are circular Predators always eat prey All animals are active during the day Animals that are not seen are not present All plants and animals will return if we stop harming habitats Building any kind of garden will help all wildlife Only animals are living things; plants are not alive If something doesn't move, it's not alive All deserts are hot Penguins don't feel the cold All animals in hot places are the same

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		All seeds grow at the same speed Baby animals will always look exactly like their parents All animals look after their babies Baby animals eat the same food as their parents from birth	
Working scientifically	Compare, classify, evaluate		
SMSC	Spiritual – To know more and to wonder about the world. To look at the world in awe and wonder. Moral – To become increasingly curious. Consider the environment. Be open minded to the suggestion of others. Social – Group practical work. Teamwork and taking responsibility. Taking responsibility for their own and other people's safety. Begin to understand that science effects our lives. Cultural – Begin to understand scientific discoveries by men and women in many cultures. Begin to understand how the environment and science are linked.		
Cultural Capital	Trip to museum – Wroughton Science Museum Science Fair British science week and World science day. Poster competition – Harwell Science.		
Year 3	**<u>How does light help us see the world around us?</u>** 1. **What is light, and where does it come from?** (light is a form of energy & identify sources – inc Sun & man-made bulbs & torches) 2. **How does light help us to see things?** (we see objects because they reflect light into our eyes & explore how light travels) 3. **What is reflection, and how do mirrors affect light?** (investigate – light bouncing off reflective surfaces & how it affects direction & what we see) 4. **What causes shadows, and how do they change?** (shadows are formed when light is blocked, size & shape depend on position of light source) 5. **What is dark, and why can't we see in the dark?** (concept of absence of light & why we cannot see without a light source) 6. **How does the Sun help us, and how can we keep safe?** (helps us to see, grow plants, keep safe from UV rays) **<u>What can rocks, soils and fossils tell us about the Earth's past and how it changes over time?</u>** 1. **What is under our feet?** (Cross section of Earth – humous, topsoil, subsoil, bedrock. Layers of Earth – crust, mantle, outer core, inner core. Crust is made of 3 diff types of rock – igneous/sedimentary/metamorphic) 2. **Why does not water drain away in some areas?** **(**different types of soil – experiment – does soil make a difference to flooding?) 3. **How do we know there are different types of rocks?** (different rocks react to different tests e.g., fizzing when vinegar is added)	**<u>Big Science</u>** **Term 3 is focussed on investigations relating to working scientifically. The children will ask questions and answer them, set up simple experiments, they will compare and learn about fair testing. They will have the opportunity to observe and take measurements using a range of equipment. They will gather data, record and present their findings in a variety of ways to help answer a question. The children will use their knowledge and learning to make predictions. They will use their findings to draw simple conclusions, suggest improvements and raise further questions.** **<u>How do forces, including magnetism, help us understand and interact with the world around us?</u>** **1.** **What are forces, and how do they act on objects?** (A force either changes the shape of a material or changes the way an object moves. It is measured in newtons (N) with a newton meter. Forces are pushes or pulls. When a force acts between two objects when they **are** touching (e.g. a hand pushing/pulling a box) it is a **contact** force. When a force acts between two objects when they **are not** touching (e.g. a magnet attracting a paperclip) it is a **non-contact** force. Non-contact forces act at a distance but get weaker when the objects get further apart.) **2.** **How do magnets attract and repel objects?** (Every magnet has two areas where its magnetic force is strongest. These are called poles. Every magnet has a north and a south pole. When the two poles are brought together, they will either attract or repel each other. North → North / South → South will repel. North → South will attract.) **3.** **Which materials will a magnet attract?** (When you put a magnet next to a magnetic material, the material will behave like a magnet, and they attract. Iron, cobalt and nickel are magnetic elements, and so are magnetic materials that contain them, e.g. some types of steel. Metallic objects that are not made with iron, cobalt or steel will not be magnetic.)	**<u>How do plants grow, survive and adapt to their environments?</u>** **1.** **What is in a seed?** (A seed contains an embryo (tiny, undeveloped plant), cotyledons (food store that provides nutrients to the growing seedling) and a seed coat (tough outer layer that protects the seed). Seeds vary in size, shape and colour depending on plant species. Seeds need water, oxygen, and the right temperature to germinate.) **2.** **Is there a relationship between the size of the seed and the length of the roots?** (Larger seeds often contain more stored food, which can help a seedling grow larger roots initially. Smaller seeds may have smaller roots but can still grow into large plants given time and the right conditions. Root length depends on several factors, including seed size, soil quality and water availability.) **3.** **Does fertiliser help plants grow?** (Fertiliser provides nutrients like nitrogen, phosphorus, and potassium, which are essential for plant growth. Nitrogen promotes healthy leaves, phosphorus supports root and flower development, and potassium helps overall plant health. Too much fertiliser can harm plants by "burning" their roots. Fertiliser works best when combined with water, sunlight, and good soil.) **4.** **How strong are plants?** (Plants can be surprisingly strong, with roots that grow through hard soil, rocks, or cracks in the pavements. Stem strength varies – trees have thick, woody stems, while herbs have soft flexible stems. Plant cells have walls made of cellulose, providing strength and structure. Some plants, like vines, use other structures for support by climbing.) **5.** **Do all plants have the same leaves and flowers?** (Plants have a wide variety of leaves and flowers that differ in size, shape, colour and texture. Leaf shapes can include broad, needle-like, lobed, or heart-shaped forms. Flowers vary in number of petals, symmetry, and colour, depending on their role in attracting pollinators. Plant features are adapted to their environment (e.g., cacti have spines instead of leaves to conserve water).)

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	4. **Do rocks change over time?** (Rock cycle and different factors e.g., sea, wind, heat can change rocks – evidence e.g., pyramids, statues) 5. **How did scientists work together to solve problems in the past?** (Paleontologists usually find parts of a fossilized skeleton, not a whole one – how do scientists work out what a whole one looks like?) 6. **How can fossils tell us about the history of our planet, and how are they made?** (How deep it is buried = how long ago the animal/plant lived, fossil records. Animal dies, soft parts decompose leaving hard (skeleton) behind, becomes buried by sediment, as this builds up turns to rock, bones dissolve by water, replaced by minerals = a fossil!)	**4.** **Which magnet will be most useful for retrieving a valuable coin which is magnetic?** (Magnetic materials i.e. iron, cobalt and nickel. Some objects (e.g. paperclips) are magnetic because steel is made from iron. Magnetic forces can act without direct contact, although the strength of attraction reduces as the object is moved further away. Heating or dropping magnets can make them less strong.) **5.** **Which types of surfaces are most slippery?** (Friction is a force that opposes motion. It is a contact force that acts when surfaces are sliding or trying to slide across each other. It can slow objects down or make it hard for objects to start moving. The amount of friction acting on an object depends on its mass and the materials that the object and the surface are made from. Smooth surfaces tend to produce less friction than rough. Can be useful as it allows us to walk, stops us slipping and allows brakes to work on bicycles and cars. Can also be a nuisance, slowing down moving objects or causing wear and tear on moving parts.)	6. **How does water travel through a plant?** Water is absorbed by roots from the soil and travels up through the plant via tiny tubes called xylem. This process is called transpiration and involves water evaporating from the leaves which pulls more water upwards. Water carries nutrients from the soil to the leaves, where it is used for photosynthesis. The movement of water also helps keep the plant rigid and upright. **How do our skeletons and muscles work together to keep us healthy?** 1. **What are bones?** (Bones are hard, rigid structures made mostly of calcium and collagen. They provide support and shape to the body. Bones protect vital organs (e.g., skull – brain, ribs – heart & lungs). Humans have 206 bones in their adult skeleton.) 2. **Do we need a skeleton?** (The skeleton supports the body, enabling us to stand upright and move. It protects internal organs. Produces blood cells in the bone marrow. Stores important minerals like calcium and phosphorus.) 3. **Do all animals have a skeleton?** (Some animals have internal skeletons made of bone (vertebrates) e.g., mammals, birds, reptiles. Some animals have external skeletons (exoskeletons) e.g., insects and crustaceans. Other animals, e.g., jellyfish and worms, have no skeleton, but rely on other features for support.) 4. **Do bones grow?** (Bones grow as a person grows, with cartilage at the ends of long bones being replaced by hard bone during development. Bones also repair themselves after injury by creating new bone tissue. Growth plates, located at the ends of bones, are responsible for lengthening bones during childhood.) 5. **How do our muscles get the energy and nutrients they need to keep us moving?** Muscles get energy from food, particularly carbohydrates and fats, which the body converts into glucose. Glucose is broken down during respiration, a process that requires oxygen to release energy. Nutrients, e.g., protein, help repair and maintain muscles. Blood delivers oxygen and nutrients to muscles through the circulatory system (Y6). 6. **Why is it important for animals to get the right nutrition?** (Nutrition provides the energy animals need to move, grow, and repair their bodies. A balanced diet ensures animals get essential nutrients like carbs (energy), proteins (growth and repair), fats (long term energy storage and warmth) and vitamins and minerals (maintaining healthy bones, skin, and organs). Malnutrition can lead to health problems, such as weak bones, poor growth, and reduced immunity.)

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Key Vocabulary	Light source, dark, rays Reflect(ive) Shadow, opaque, transparent, translucent Control variable, valid experiment Rock, stone, pebble, boulder, soil. Fossil Grain, crystals, layers, texture, Marble, chalk, granite, sandstone, slate Soil, peat, sandy/chalk/clay soil, silt	Force, push, pull, contact and non-contact force, friction, magnetic, attract, repel, north and south pole, magnetic field, material, iron, steel, cobalt, nickel, bar magnet, disc magnet, horseshoe magnet, smooth, rough, resistance	Plant, growth, seed, germination, roots, stem, leaves, flowers, nutrients, soil, embryo, cotyledon, seed coat, sprout, seedling, petal, pollen, xylem, photosynthesis, absorption, pollination, transpiration, fertiliser Skeleton, bones, joints, muscles, cartilage, bone marrow, calcium, collagen, hardness, protection, structure, support, protection, blood cells, minerals, vertebrates, invertebrates, exoskeleton, growth plates, glucose, oxygen, circulatory system, malnutrition, carbohydrates, proteins, fats, vitamins
Common misconceptions	**Light** I see things because I look at them (not light from object entering the eye) Bedrooms at night are dark We can see in the dark Only shiny objects reflect light Shadows can exist without light Light only exists at the source and on the objects that we see **Rocks** All rocks are hard/heavy Bricks and concrete are rocks Fossils are bits of actual extinct living matter	**Forces** Throw or kick is not a contact force because it acts for such a short time Objects stop moving because the force pushing them disappears Magnets “stick” to objects Magnets can only attract Magnets can attract from any distance Bigger magnets are always stronger All metals are magnetic A magnet’s strength is the same all over its surface	**Plants** All seeds are the same size and contain the same amount of food Seeds need sunlight to germinate Plants “eat” food from the soil Roots only anchor the plant in the ground Stem only holds the plant upright Fertiliser is food for the plant Water travels through the plant by soaking into the stem All plants have leaves and flowers All plants grow in soil **Animals** Bones are solid and unchanging Bones are not connected to each other All animals have the same type of skeleton as humans The skeleton only helps with movement Bones stay the same size after birth Broken bones cannot heal Muscles work without needing energy Exercise uses energy but doesn’t make muscles stronger Fat is bad for you Only meat contains protein All animals need the same diet
Links		**Prior** Describing simple physical properties of a variety of everyday materials (Y1) Comparing and grouping together a variety of everyday materials based on their physical properties (Y1) Finding out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching (Y2) **Future** Identifying the effect of friction that acts between moving surfaces (Y5) Explaining that unsupported objects fall towards the Earth because of gravity acting between the Earth and the falling object (Y5) Knowing that around any magnet there is a region in which another magnet experiences a force, called a field (KS3) Knowing that a magnet has two places called poles at which its magnetic field is the strongest (KS3) Knowing that a magnetic field gets gradually weaker with distance from the magnet (KS3)	

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		Comparing patterns in magnetic field lines when pairs of magnets are repelling or attracting (KS3) Using arrows in force diagrams, adding forces in one dimension (KS3) Recognising and commenting on the effects of balanced and unbalanced forces (KS3)	
Working scientifically	Identify, research, measure, communicate findings, models		
SMSC	Spiritual – To know more and to wonder about the world. To look at the world in awe and wonder. The interdependence of all living things and materials on Earth. Moral – To become increasingly curious. Consider the environment. Be open minded to the suggestion of others. Social – Group practical work. Teamwork and taking responsibility. Taking responsibility for their own and other people's safety. Begin to understand that science effects our lives. Cultural – Begin to understand scientific discoveries by men and women in many cultures. Begin to understand how the environment and science are linked.		
Cultural Capital	British science week and World science day. Science Fair Poster competition – Harwell Science. Phizz Lab trip – Millbrook Primary School.		
Year 4	**How do materials change and behave in different states?** 1. **How can we sort materials?** (Materials can exist in different states - solids, liquids and gases.) 2. **How do we change the state of different materials?** (From liquid to a gas or a solid - freezing/melting/boiling. Changes are often reversible and part of man-made/natural processes) 3. **At what temperatures do changes of state happen?** (different materials change state at specific temperatures, melting/freezing/boiling points vary between materials) 4. **What is evaporation and condensation?** (E = liquid to gas, C = gas to liquid. Physical changes that can be observed & measured. Part of the water cycle (part of nature)– next lesson.) 5. **What is the role of evaporation and condensation in the water cycle?** (Help to move water between Earth and atmosphere – water from lakes etc. evaporates into water vapour, which rises and cools to condense into clouds. Condensed water falls back to ground as precipitation (rain/snow) completing cycle) 6. **How does temperature affect the rate of evaporation?** (High temperatures increase rate of evaporation – particles gain more energy and escape from liquid's surface more quickly. Surface area/airflow/humidity also affect evaporation rates) **What affects how we hear and experience different sounds?** **With this unit, you could set one of your homework tasks to research and create a leaflet answering the question "can we hear all sounds?".** 1. **How is sound made?** (sound waves caused by vibrations of something – big vibrations make loud sounds, small make quiet sounds) 2. **How can we vary the pitch of sound?** (Experiment - The pitch is determined by the frequency – how	**Big Science** **Term 3 is focussed on investigations relating to working scientifically. The children will ask questions and answer them, set up simple experiments, they will compare and learn about fair testing. They will have the opportunity to observe and take measurements using a range of equipment. They will gather data, record and present their findings in a variety of ways to help answer a question. The children will use their knowledge and learning to make predictions. They will use their findings to draw simple conclusions, suggest improvements and raise further questions.** **How can we control electricity to make things work?** 1. **What sort of electricity do appliances use?** (Lots of appliances run on electricity. Appliances use either batteries or mains electricity (they are plugged into the wall) It is important that we stay safe when using electricity). 2. **What is the role of a conductor and an insulator?** (A conductor is a material that allows electricity to flow through it easily, e.g. metals like copper, aluminium and silver, and water. An insulator is a material that does not allow electricity to flow through it easily, e.g. plastic, rubber, glass, and wood.) 3. **How does a switch control a lamp in a circuit?** (Constructing a simple circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. A switch opens and closes a circuit. Once closed, the circuit is complete, and the bulb will light.) 4. **Can we recognise if a circuit is not complete?** (If the circuit has a break, or if the connection of the cells and bulbs are not correct, the circuit is not complete.) 5. **How can we design an alarm system?** (The buzzer will sound when the circuit is complete. Design a circuit where when the door closes, the circuit completes and the alarm sounds.) 6. **Does our alarm system work and how can we improve it?**	**How do animals survive and thrive in different underwater habitats, and why is it important to protect them?** 1. **How can we use the work of other scientists to identify animals?** (Scientists share the knowledge they gain in their jobs to learn. Use of a branching database to identify animals – scientists have found out this information about each animal and shared it to create a classification key that everyone can use to identify unknown animals. Classification systems allow scientists to group animals based on shared characteristics) 2. **How do mammals survive in the ocean?** (Mammals e.g., whales, dolphins and seals have adaptations that help them survive. Blubber provides insulation in cold water. Streamlined bodies and fins help them swim efficiently. Lungs allow them to breathe air, and they hold their breath underwater. Echolocation (e.g., dolphins) helps them navigate and hunt. Marine mammals are warm-blooded, meaning they regulate their body temperature in the ocean.) 3. **Which animals live in the water, and are they vertebrates or invertebrates?** Aquatic animals include vertebrates (e.g., fish, amphibians, and marine mammals) and invertebrates (e.g., jellyfish, crabs, and starfish). Vertebrates have a backbone, invertebrates do not. Aquatic vertebrates include sharks, whales, and frogs, while aquatic invertebrates include octopuses, corals, and plankton. All aquatic animals have adaptations for swimming, breathing (gills or lungs) and surviving in water environments.) 4. **Are all underwater habitats the same?** Underwater habitats vary widely, including coral reefs (warm, shallow waters with high biodiversity), deep sea (cold, dark, and high-pressure environments with unique species e.g. anglerfish), freshwater (lakes, rivers and ponds with species like freshwater fish and frogs) and mangroves (coastal wetlands with roots that filter water and protect animals). Animals in each habitat have specific adaptations to survive in their environments (e.g., bright colours in coral reefs, bioluminescence in deep sea).) 5. **What do marine animals eat?**

	many times something vibrates in one second – higher frequency (higher number of Hz/higher the pitch. Also linked to features – length/thickness/tightness of strings) 3. **How does sound travel?** (Experiment – string telephones. Sound travels through solids and air: investigate water/gas/vacuum) 4. **How far does sound travel**? (Experiment – sound waves weaken as they travel, making sound quieter. Factors e.g. obstacles, air density, volume of sound source affect travel.) 5. **Can we make it harder for sound to travel?** (Exposure to volumes above 85 decibels can have a severe impact on hearing. Scenarios where people are exposed to sounds greater than this/when do we need to hear? Experiment) 6. **Do animals hear sounds differently?** (Different shaped ears – does it make it easier to hear? Research diff animals & how they hear)	(Create the alarm and test it – how can they improve it to work every time? Challenge to see if they can create an alarm that sounds when the circuit is not complete.)	(Marine animals have diverse diets. Herbivores eat plants or algae (e.g. sea turtles eat seagrass), carnivores eat other animals (e.g. sharks eat fish, seals eat squid), omnivores eat both plants and animals (e.g. crabs eat algae and small fish) and filter feeders strain small organisms like plankton from the water (e.g. whales and sponges). Food chains in marine ecosystems depend on producers (e.g., algae) and consumers (e.g., fish, seals, and sharks).) **6. Would it matter if sharks became extinct, and how can we help them?** (Sharks are apex predators, which means they are at the top of the food chain and keep ecosystems balanced by controlling prey populations. Without sharks, prey species could overpopulate, disrupting marine ecosystems. Overfishing, habitat destruction and pollution threaten shark populations. Conservation efforts include protecting habitats, regulating fishing, and raising awareness about sharks' importance in the ecosystem.) **<u>How does the digestive system work to keep our bodies healthy?</u>** **1. What is the digestive system?** (Main organs are mouth, oesophagus, stomach, small and large intestines, anus. The overall purpose is to break down food into nutrients that the body can use and to remove waste.) **2. How does food travel through the digestive system?** (1st Mouth – chewed and mixed with saliva. 2nd Moves down the oesophagus into the stomach where it is further broken down by stomach acid. 3rd Nutrients are absorbed in small intestine. 4th waste is processed in large intestines. 5th Waste leaves the body through anus.) **3. How do different types of teeth help with digestion?** 1st Incisors cut food. 2nd Canines tear food. 3rd Molars grind food into smaller pieces. Saliva begins the chemical process of breaking down food in the mouth. Properly chewing your food makes the digestive process more efficient. **4. What happens to food in the stomach?** (Stomach uses acid and enzymes to break food into smaller molecules. Enzymes are proteins that speed up the digestion of carbs/fat/protein. Stomach churns food into a liquid (called chyme) before it gets to the small intestine.) **5. How do the intestines help the body get nutrients from food?** (Small intestines absorb nutrients into the bloodstream through small structures called villi. Large intestines absorb water and forms waste from leftover food. Nutrients are delivered to the body for energy and growth.) **6. How can we keep our digestive system healthy?** (Eating a balanced diet (including fruit, vegetables, and whole grains) provides fibre. Drinking water moves food through the digestive system. Regular physical activity supports healthy digestion. Avoiding too much sugar and processed food leads to less digestive problems.)

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Key Vocabulary	Solid, liquid, gas, mixture, melting, freezing, boiling, evaporation, condensation water vapour precipitation, rate, humidity, variable Pitch, volume, vibration Medium, solid, liquid, gas decibels	Electrical appliance, electricity, batteries, mains electricity, plug, socket, safety, electric shock, invention, flow, conductor, insulator, material, property, metals (copper, iron, steel), graphite, wire, loop, circuit (wire, battery, lamp, switch, crocodile clips), complete circuit, break/gap, component,	Vertebrate, invertebrate, endoskeleton, exoskeleton, mammal, bird, fish, reptile, amphibian, crustacean, mollusc, branching database, predator, prey, consumer, producer, marine, coral, endangered, extinct, ecosystem, biodiversity, conservation, classification, apex predator Digestion, nutrients, organs, enzymes, absorption, waste, energy, system, function, food breakdown, process, mouth, oesophagus, stomach, small and large intestine, anus, peristalsis, teeth, incisors, canines, molars, premolars, chew, grind, tear, saliva, churn, acid, chyme, villi, bloodstream, bacteria, fibre, balanced diet, hydration, exercise
Common misconceptions	**Changing states** Solids cannot change shape Melting and dissolving/freezing and cooling are the same process Water disappears when it evaporates Condensation only happens on cold surfaces Steam is the same as water vapour Ice is not water Gases are not matter because they are invisible Liquids cannot be compressed Objects get lighter as they melt/evaporate Boiling happens at the same temperature for all liquids **Sound** Pitch and volume are the same thing/muddling meanings Sound only travels through air Sound is slowed down by physical obstructions Sound gets quieter because it has faded or run out of energy Our ears produce the sound we hear Humans hear all sounds	**Electricity** Electricity comes from batteries or plugs, and the source itself contains “electricity”. A circuit only works if the wires are touching the battery or the bulb directly. Insulators stop electricity from existing. Switches “create” electricity when turned on. Bigger batteries make devices “work harder” or faster. A bulb lights up because electricity stays inside it. The material of the wires doesn’t matter. Circuits are powered by one wire rather than needing two (positive and negative connections). Electrical appliances all work the same way. Only visible parts of a circuit matter (e.g. wires and bulbs).	**Habitats** Whales, jellyfish and starfish are all fish Carnivores are big or ferocious, or both Herbivores are small and passive Animals live anywhere they want All habitats are the same All animals with shells are invertebrates Invertebrates are small All ocean animals have gills to breathe underwater Blubber is just fat All underwater habitats are dark and cold All fish live in the same type of water All marine animals eat fish The biggest predators eat the most If sharks disappear, it won’t affect the ocean Only scientists can help protect marine animals **Digestive system** The stomach is the only organ involved in digestion Digestion happens instantly after food is swallowed Food travels through digestive system by gravity All teeth are the same Teeth are only important for chewing The stomach does all the digestion Stomach acid dissolves everything The intestines are just tubes for moving food The large intestine stores food Only unhealthy food affects digestion Eating quickly doesn’t affect digestion The digestive system is only for food

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Working scientifically	Asking questions, gathering, classifying and presenting data, planning simple tests, carrying out an identifying and classifying enquiry, using scientific ideas to solve problems, using scientific drawings to communicate ideas, evaluating solutions, using scientific vocabulary, interpreting scientific drawings, recording observations, using observations to answer questions, using test results to suggest improvements,
SMSC	Spiritual – To know more and to wonder about the world. To look at the world in awe and wonder. The interdependence of all living things and materials on Earth. Wonder at the vastness of space and the beauty of natural objects. Moral – To become increasingly curious. Consider the environment. Be open minded to the suggestion of others. Social – Group practical work. Teamwork and taking responsibility. Taking responsibility for their own and other people's safety. Begin to understand that science effects our lives. Cultural – Begin to understand scientific discoveries by men and women in many cultures. Begin to understand how the environment and science are linked.
Cultural Capital	Phizz Lab trip – Millbrook Primary School. Trip to Sutton Nature Reserve British science week and World science day Science Fair Poster competition – Harwell Science.

Year 5

How does the Earth, the Moon and the planets affect life on our planet?

1. **What is in our solar system?**
   (The sun, eight planets, their moons, other celestial bodies e.g. asteroids and comets. Sun is a star at centre of the solar system and its gravity keeps planets in orbit. Planets are distinct from stars because they reflect light rather than emit it)
2. **Why do we have day and night?**
   (Caused by the Earth's rotation on its axis – different parts face towards or away from the Sun. 24 hrs to complete one full rotation – one day and one night cycle)
3. **Why do summer days have more daylight hours than winter days? (Is this true for everywhere on the planet?)**
   (Tilt of the Earth leads to varying daylight hours and seasons – one hemisphere is tilted towards Sun; it experiences summer and longer daylight hours)
4. **What shape are the planets?**
   (Roughly spherical due to gravity which pulls material towards the centre evenly – oblate spheroid – planets are slightly flattened at poles and bulging at equator due to rotation)
5. **How can the moon change shape?**
   (Lunar cycle/phases of the moon – caused by relative positions of the Earth, Moon and Sun, with parts of moon illuminated differently as it orbits Earth. Names – new moon/crescent/quarter/gibbous/full moon)
6. **What is gravity?**
   (Force that attracts objects with mass towards each other - larger objects exert more gravitational pull. Reason why objects fall to the ground, and why we are held on Earth's surface. Keeps planets in orbit around Sun, and Moon orbiting Earth)

How do different forces affect the movement of objects?

1. **What is air resistance and how does it affect how objects fall?**
   (Force that opposes motion of objects moving through air – type of friction. Slows down falling objects. Size, shape and speed of object influences amount of air resistance it experiences – larger or flatter surfaces encounter more)
2. **What affect does water resistance have on the movement of objects through water?**
   (Also known as drag. Force that opposes motion of objects

Big Science

Term 3 is focussed on investigations relating to working scientifically. The children will ask questions and answer them, set up simple experiments, they will compare and learn about fair testing. They will have the opportunity to observe and take measurements using a range of equipment. They will gather data, record and present their findings in a variety of ways to help answer a question. The children will use their knowledge and learning to make predictions. They will use their findings to draw simple conclusions, suggest improvements and raise further questions.

How can we separate and recover materials based on their properties?

1. **What methods can we use to separate different materials effectively?**
   (Materials can be separated using different physical methods such as filtering, sieving, or using magnets, depending on the properties of the materials. Recycling is a way of separating materials.)
2. **What factors influence the rate at which sugar dissolves?**
   (Factors such as temperature, stirring and particle size affect how quickly a solid dissolves in a liquid.)
3. **How can we separate a mixture of salt and sand?**
   (Differences in solubility and physical properties allow for separation, e.g., dissolving salt in water, filtering the sand, and evaporating the water to recover the salt.)
4. **Is it possible to recover a material after it has been mixed or dissolved?**
   (Some materials (e.g., salt and water) can be recovered through processes like evaporation (covered in Y4), however some materials (e.g., sugar in tea) may not be as easily separated once altered.)
5. **How can we accurately identify substances based on their properties?**
   (Observation: sugar – crystalline and gritty; salt – crystalline but finer than sugar; flour – soft, powdery, and smooth; bicarb of soda – fine, slightly gritty powder; citric acid – crystalline, similar to sugar but finer. Solubility in water: sugar and salt dissolve completely; flour forms a paste or suspension; bicarb of soda dissolves with mild bubbling; citric acid dissolves. Vinegar: bicarb of soda fizzes vigorously; citric acid mild fizzing; sugar, salt and flour have no reaction. Heating test: sugar – melts and caramelizes, turning brown; flour – slight burning smell, no melting; bicarb – decomposes, releasing gas; salt – no change; citric acid – melts and may emit faint acidic odour.)
6. **How does thermal insulation work, and why is it important?**

How do simple machines help us make work easier?

1. **How does using a lever change the effort needed to lift a heavy object?**
   (A lever is a simple machine that consists of a rigid bar and a fulcrum (pivot point). Levers reduce the amount of effort needed to lift a heavy object by increasing the distance over which the force is applied. The position of the fulcrum affects the effort needed: the closer the fulcrum is to the load; the less effort is required. Levers are commonly used in doors, staplers, wheelbarrows, and seesaws.)
2. **How does using a pulley change the effort needed to lift a load?**
   (A pulley is a wheel with a groove around its edge for a rope or cable. A single fixed pulley changes the direction of the force, making it easier to lift a load. A system of pulleys reduces the effort needed by distributing the weight of the load across multiple ropes. Pulleys are commonly used in cranes, flagpoles, and elevators.)
3. **How do inclined planes affect the effort needed to move objects?**
   (An inclined plane is a flat surface set at an angle, like a ramp. Inclined planes allow heavy objects to be moved to a higher or lower height with less effort, but over a greater distance. The steeper the incline, the more effort used. Inclined planes are used in ramps, slides and loading docks.)
4. **What are gears and how do they change the speed or force of movement?**
   (Gears are wheels with teeth that interlock and transfer movement and force. Larger gears turn more slowly but increase force, while smaller gears turn faster but reduce force. Gears can change direction of motion, speed it up, or slow it down. Gears are used in machines like bicycles, clocks, and car engines.)
5. **What effect do wheels and axles have on the movement of objects?**
   A wheel and axle is a simple machine where a wheel is attached to a central axle. It reduces friction, making it easier to move or carry loads over a distance. Turning the wheel causes the axle to turn, and vice versa, transferring force. Wheels and axles are used in carts, vehicles, and windmills.)
6. **Can we create a simple machine to solve a classroom problem?**
   (Simple machines combine levers, pulleys, inclined planes, wheels and axles, or gears to make tasks easier. They reduce the effort needed to complete a task by multiplying force or changing its

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	through water – slowing them down. Depends on shape, size and speed of object – streamlined shapes experience less resistance. Water is denser than air, so water resistance is generally stronger than air resistance – moving through water requires more energy) **3. What is friction and how does it affect movement?** (Force that acts between two surfaces in contact, opposing their movement – slows down or stops moving objects. Produces heat & reducing makes movement easier. Depends on texture of surfaces – rough creates more friction than smooth. Useful in situations like walking – prevents slipping – but can hinder situations where smooth movement is needed) **4. What affect do parachutes have on moving objects?** (Increase air resistance – creates larger surface area – significantly slows down descent of object/person. Design – shape and size – determines level of resistance created. Used to counteract gravity) **5. Why do some objects move faster through water than others?** (Streamlined/smooth narrow shapes move faster because they experience less water resistance. Rounded/irregular shapes create more drag, slowing the object down. Fish are naturally streamlines to reduce water resistance – boats/submarines/aquatic animals) 6. **How can we reduce resistance to make moving objects go faster?** (Air/water resistance reduction – streamlined shapes. Practical adaptations e.g. sports cars/bicycles/aircraft. Applied in engineering and design to enhance speed and efficiency)	(Thermal insulation reduces heat transfer by trapping air or using materials with low conductivity. Real world applications include keeping homes warm, or conserving energy.)	direction. Examples include using a lever to lift a heavy box, building a pulley system to raise a classroom flag, or creating a ramp to move a book trolley.) **<u>How do different living things grow, change and reproduce?</u>** **1. What is the purpose of pollination?** (Pollination is the transfer of pollen from the male part of the flower (anther) to the female part (stigma) to allow fertilisation. Fertilisation leads to the production of seeds, which grow into new plants. Pollination can occur through wind, water, or animals (e.g., bees, butterflies). Flowers have adaptations like bright colours, scents, and nectar to attract pollinators.) **2. How do plants and vertebrates make new life?** (Plants reproduce sexually through pollination and fertilisation, resulting in seeds that grow into new plants. Vertebrates reproduce sexually, with sperm from the male fertilising the egg from the female, leading to offspring. Both plants and vertebrates pass on genetic material (DNA) to their offspring.) **3. How do the lifecycles of amphibians differ from mammals?** (Amphibians: lay eggs in water, go through metamorphosis with distinct stages (egg, larva, adult), have gills as larvae and lungs as adults. Mammals: give birth to live young, young are nourished by milk from mother, develop into adults without major physical changes like metamorphosis) **4. Are all insect lifecycles the same?** (No, insects have two types of lifecycles. Complete metamorphosis (four stages – egg, larva, pupa, adult) e.g., butterflies, beetles. Incomplete metamorphosis (three stages – egg, nymph (resembles smaller version of the adult), adult) e.g., grasshoppers and dragonflies.) **5. What do plant lifecycles look like?** (Involve several stages – seed germination (seed absorbs water and embryo starts growing), seedling (young plants grows roots, stems, and leaves), adult plant (produces flowers for reproduction), pollination and fertilisation lead to formation of new seeds. Some plants (like annuals) complete their lifecycle in one year, while perennials live for many years.) **6. How are seeds dispersed?** Seeds are dispersed to reduce competition and ensure species survival. Methods include wind (seeds are light or have structures like wings – dandelions, maples), water (seeds float and are carried by water – coconuts), animals (seeds are eaten and excreted, or stick to fur – berries, burdock), explosion (pods burst open to scatter seeds – peas/beans). Seed dispersal ensures seeds can grow in suitable environments.

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Key Vocabulary	Planet, star, sun, moon, satellite Axis, rotate Gravity, orbit, elliptical Force, resistance, friction, gravity Streamlined, drag, lubrication Surface area, weight, balanced and unbalanced forces	Materials, mixture, solubility, insoluble, dissolve, properties, solution, reversible/irreversible change, filtration, sieving, evaporation, magnetism, separation, residue, filter paper, solvent, solute, rate of dissolution, thermal insulation, conduction, convection, radiation, insulator, conductor, heat transfer, energy efficient	Force, effort, load, work, gravity, friction, resistance, push, pull, simple machine, lever, fulcrum, pulley, inclined plane, ramp, gears, teeth (gears), axle, wheel, mechanical advantage, input force, output force, direction of force, efficiency Lifecycle, reproduction, pollination, fertilisation, germination, offspring, adaptation, DNA, environment, pollinator, anther, stigma, pollen, nectar, ovary, petal, sepal, seed, fruit, vertebrate, amphibian, mammal, metamorphosis, egg, larva, nymph, pupa, adult, live young, dispersal, seedling, pod, explosion
Common misconceptions	**Earth & Space** The sun is not a star/is a planet There is no gravity in space The sun moves across the sky The sun and moon replace each other The Earth is flat The moon produces its own light **Forces** Heavier objects fall faster than lighter ones Objects in motion do not need a force to keep moving Friction is always bad Air resistance only affects objects in motion Air resistance does not exist in free fall Objects stop moving because the force has “run out” Streamlined shapes reduce all forces Water and air resistance are the same Friction always slows down Only smooth surfaces reduce friction	**Materials** Dissolving is the same as melting A substance disappears completely when it dissolves Only hot water can dissolve substances Filtration removes dissolved substances Salt and sand cannot be separated once mixed All changes can be undone Burning is the same as melting Insulators stop heat completely All shiny materials are good insulators	**Forces** The longer the lever, the heavier the object it can lift Levers reduce the effort required but do not reduce the total work done A single pulley makes lifting a load easier Pulleys work without any force applied Inclined planes eliminate effort completely Steeper ramps are always better for moving objects Larger gears always make things move faster Gears must always be the same size to work together Wheels eliminate all friction Turning the wheel and axle always requires the same amount of effort Simple machines create energy Simple machines make work disappear **Growth & reproduction** All flowers are pollinated by bees Pollen is only found in flowers Pollination always results in seeds All plants produce flowers to reproduce Vertebrates only reproduce by giving birth to live young Seeds are the only ways plants reproduce All animals have the same lifecycle stages All amphibians have the same lifecycle All seeds are dispersed by wind Seeds always grow where they land Larger seeds grow into larger plants Pollination and fertilisation are the same
Links	**Prior** Describing the physical properties of everyday materials (Y1) Comparing how things move on different surfaces (Y3) Noticing some forces need contact between two objects, but others can act at a distance (Y3) **Future** Recognising and commenting on the effects of balanced and unbalanced forces (KS3) Using force arrows in diagrams, adding forces in one dimension (KS3)		**Prior** Identifying the effect of friction that acts between moving surfaces (Y5) Explaining that unsupported objects fall towards the Earth because of gravity acting between the Earth and the falling object (Y5) Identifying the effects of friction, water resistance and air resistance, that act between moving surfaces (Y5) **Future** Defining a moment as the turning effect of a force (KS3) Calculating moments in real-life situations (KS3) Recognising and commenting on the effects of balanced and unbalanced forces (KS3) Using force arrows in diagrams, adding forces in one dimension (KS3)

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Working scientifically	Research, model, represent, plot, understand		
SMSC	Spiritual – To know more and to wonder about the world. To look at the world in awe and wonder. The interdependence of all living things and materials on Earth. Wonder at the vastness of space and the beauty of natural objects. Moral – To become increasingly curious. Consider the environment. Be open minded to the suggestion of others. Social – Group practical work. Teamwork and taking responsibility. Taking responsibility for their own and other people's safety. Begin to understand that science effects our lives. Cultural – Begin to understand scientific discoveries by men and women in many cultures. Begin to understand how the environment and science are linked.		
Cultural Capital	Phizz Lab trip – Millbrook Primary School. British science week and World science day Poster competition – Harwell Science. Sun Dome, FCC scientists visit, FCC engineering visit, We the Curious Science Centre trip, FCC STEM Days		
Year 6	**How can we vary the effects of electricity?** 1. **How do you represent a simple circuit?** (Basic circuit symbols – batteries, wires, bulbs, buzzers, switches, motors etc. to draw an accurate diagram. Use a ruler, no labelling, always in pencil.) 2. **Can we explain why a component is not working in a circuit?** (A break in the circuit, loose connections, drained battery, faulty components, connections to wrong ends – all of this prevents circuit from working) 3. **Why does the brightness of a bulb change?** (Depends on amount of electrical current flowing through bulb. Adding more components in series reduces brightness as it divides current between them) 4. **How does voltage affect the brightness of a bulb?** (Voltage is "push" behind the current – higher voltage increases brightness as more current is pushed through circuit) 5. **How have scientific ideas about electricity changed over time?** (Thales of Miletus – began to use science instead of mythology to explain world around us. William Gilbert – first person to use the word "electricity" to describe phenomena he observed. Benjamin Franklin – lightning = electricity and +ve and -ve charge. Michael Faraday – invented the electric motor. Lewis Howard Latimer – created a more efficient, less expensive light bulb (carbon filament). Mildred S Dresselhaus – invented the Lithium-ion battery.) 6. **Can we design and build an electrical game that demonstrates our understanding of electricity?** (practical understanding of how to complete and control circuits, safe handling of components and drawing of accurate circuit diagrams) **How does light influence the way we experience the world?** 1. **How does the presence or absence of light affect our senses and perception of the world?**	**Big Science** **Term 3 is focussed on investigations relating to working scientifically. The children will ask questions and answer them, set up simple experiments, they will compare and learn about fair testing. They will have the opportunity to observe and take measurements using a range of equipment. They will gather data, record and present their findings in a variety of ways to help answer a question. The children will use their knowledge and learning to make predictions. They will use their findings to draw simple conclusions, suggest improvements and raise further questions.** **How does the circulatory system support the body and help keep us healthy?** 1. **What are the major organs of the human body, and what are their functions?** (Heart: pumps blood around the body. Lungs: take in oxygen and remove carbon dioxide. Brain: controls the body and processes information. Liver: processes nutrients and detoxifies harmful substances. Stomach: breaks down food for digestion. Intestines: absorbs nutrients (small) and removes waste (large). Kidneys: filter waste from the blood and produces urine. Organs work together in systems (e.g., circulatory – Y6, respiratory, digestive – Y4). 2. **Why is oxygen essential for the human body, and how is it transported?** (The heart is a strong, muscular pump that keeps blood moving around the body. It has four chambers (two at top – atria, two at bottom – ventricles). Blood that is low in oxygen comes into the right side of the heart. The heart pumps this blood to the lungs, where it picks up oxygen and gets rid of carbon dioxide. Oxygen-rich blood returns to the left side of the heart, which then pumps it to the rest of the body. Blood travels through arteries (oxygen-rich blood from heart to body), veins (oxygen-poor blood back to heart) and capillaries (tiny blood vessels where oxygen and nutrients move into cells, and waste like carbon dioxide moves out). Blood carries red blood cells (oxygen from lungs to the body and carbon dioxide back to lungs), plasma (carries nutrients and hormones), white blood cells (fight infections), and platelets (help form clots when we get a cut). Circulatory system delivers oxygen and	**How has life on Earth changed over time, and why is this important for the future?** 1. **What is variation?** (Variation refers to the differences between individuals of the same species. These differences can be inherited (genetic) or caused by the environment. Examples include eye colour, height, or fur patterns. Variation is essential for natural selection and helps species to adapt to their environments.) 2. **Are we unique and why is that important?** (Every individual has a unique combination of genetic traits inherited from their parents. DNA determines characteristics like eye colour, hair type and more, Uniqueness is important because it contributes to a population's ability to adapt to environmental changes. Human uniqueness also allows for diverse talents, skills and perspectives, benefitting society.) 3. **How does the theory of evolution explain the diversity of life on Earth?** (Charles Darwin proposed the theory of evolution by natural selection. Evolution occurs as organisms with advantageous traits survive and reproduce, passing these traits to offspring. Over long periods, small changes accumulate, leading to the development of new species. The theory explains the variety of plants and animals we see today as adaptations to different environments.) 4. **Why do some animals become extinct whilst others survive?** (Extinction occurs when a species can no longer survive and reproduce in its environment. Factors causing extinction include habitat loss, climate change, disease and competition. Animals with traits that help them to adapt are more likely to survive and thrive. Conservation efforts aim to prevent extinction by protecting habitats and addressing human impacts.) 5. **Has science understanding of prehistoric animals evolved?** (Early ideas were based on fossil discoveries and speculation. Advances in technology (e.g. CT scanning) and techniques (e.g. DNA analysis) have improved understanding. Scientists now know more about dinosaurs' appearances, diets, and behaviours, including the connection between dinosaurs and modern birds. Discoveries like

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	(Without light, our eyes cannot detect objects, colours or details. In its absence, our other senses become more prominent in helping us to understand and navigate our environment.) 2. **How does light travel?** (straight lines until it hits an object – we can predict where light will shine and can direct it with reflective surfaces) 3. **How do we use light to see?** (we see because light reflects off them and enters our eyes – it must bounce off an object and reach our eyes for it to be visible. No light = cannot see) 4. **Which material reflects the most light?** (Shiny, smooth and light-coloured materials reflect most light e.g. mirrors/polished metals. Dark/rough materials absorb more light and reflect less) 5. **How do properties of a material affect the amount of light they reflect?** (smooth, shiny surfaces allow light rays to bounce off in an organized way. Rough, dark surfaces scatter light in different directions, absorbing more than they reflect) 6. **How are shadows made?** (Shadows form when an opaque object blocks the path of light, preventing it from reaching a surface – light cannot bend so the area creates a shadow on the opposite side of the light source showing the outline of the object blocking the light.)	nutrients that your body needs to survive and takes away waste products to keep you healthy.) 3. **What impact does exercise have on heart rate and why?** (During exercise: muscles need more oxygen and energy. Heart beats faster to pump more oxygen-rich blood to muscles. Blood vessels widen (vasodilation) to increase blood flow. After exercise: heart rate gradually returns to resting level (recovery time depends on fitness). Regular exercise strengthens the heart and improves overall fitness.) 4. **Is there a relationship between a person's height and lung capacity?** Taller people often have larger lungs because their ribcage and chest cavity are bigger. This allows them to take in more air and have a higher lung capacity. Can be measured with a spirometer or by simple experiments like blowing into a balloon. Other factors, e.g., fitness, age, and health, also affect lung capacity. 5. **How can we determine whether different foods are beneficial for our health?** Balanced diet – carbs, proteins, fats, vitamins, minerals, water, fiber – right amounts of each group. Nutritional value – read food labels to identify nutrients and avoid high levels of sugar, salt, and unhealthy fats. Foods like fruits, veg, whole grains, and lean proteins are beneficial for health. The impact of food on energy, growth, repair, and overall well-being should be considered. 6. **How does the circulatory system support the body and help keep us healthy?** Summary of everything learnt in the unit – project/presentation based.	feathered dinosaurs show how scientific theories evolve as new evidence emerges.) 6. **Why are superbugs a problem?** (Superbugs are bacteria that have become resistant to antibiotics. Resistance develops when bacteria evolve to survive the drugs designed to kill them. Overuse and misuse of antibiotics contribute to the development of superbugs. They are a global problem because they make infections harder to treat, requiring new medicines and strategies.) **<u>How do scientists group and identify living things, and why is this important?</u>** 1. **Why is classification important?** (Classification helps scientists group and organise living things based on their similarities and differences. It makes it easier to study, understand and communicate about biodiversity. It allows us to predict characteristics of organisms within groups. It is essential for tracking species, studying ecosystems and understanding evolution.) 2. **Who created the classification chart that we use today?** Carl Linnaeus developed the modern system in the 18th century. He introduced "binomial nomenclature" – two-part scientific naming of organisms. He organised living things into categories: kingdom, phylum, class, order, family, genus, and species. The system has been adapted and expanded with advancements in genetics and evolutionary biology.) 3. **Can you classify some unknown animals?** Classification relies on observable characteristics, e.g. body structure, diet and habitat. Animals can be grouped into vertebrates (mammals, birds, reptiles, amphibians, fish) and invertebrates (insects, molluscs, arachnids). 4. **Can I follow a key to identify an animal?** (A classification key is a step-by-step tool that uses yes/no questions or choices about an organism's features. Keys help to identify organisms by narrowing down possibilities based on observable traits. Feature such as body shape, number of legs, or presence of wings are used in keys. Correctly following a key involves attention to detail and knowledge of biological terms.) 5. **Can I create a key to identify penguins?** Creating a key involves listing distinguishing features of penguin species (e.g. size, beak shape, feather colour, or habitat). For example, an emperor penguin is the largest penguin and has a yellow neck patch. Or a little penguin is the smallest penguin and has blue-grey feathers. Dichotomous keys divide choices into two options at each step. 6. **How are scientists using classification now?** (Scientists use classification to study evolutionary relationships and genetic similarities. Modern classification incorporates DNA analysis to refine groupings. It helps in conservation efforts, identifying endangered species and protecting ecosystems. Classification

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			support medical research by studying bacteria, viruses and other organisms. It also plays a role in understanding the impact of clime change on species and habitats.)
Key Vocabulary	Electricity, circuit, current, voltage, component Battery, cell, bulb, switch, series circuit, resistance Short circuit, voltmeter, ammeter Light source, reflection, refraction, absorption transparent, translucent, opaque, shadow,	Organs, functions, heart, lungs, brain, liver, kidneys, digestive system, respiratory, oxygen, carbon dioxide, red blood cells, haemoglobin, alveoli, blood circulation, heart rate, pulse, fitness, energy, muscles, aerobic exercise, respiration, lung capacity, height, spirometer, vital capacity, nutrition, balanced diet, carbohydrates, proteins, fats, vitamins, minerals, drugs, stimulants, alcohol, tobacco, caffeine, addiction, effects	Variation, inherited traits. Environment, adaptation, natural selection, evolution, species, extinction, fossil, prehistoric, DNA, genes, selective breeding, survival, superbugs, antibiotics, resistance, biodiversity, habitat, palaeontology, offspring Classification, organism, characteristic, species, genus, kingdom, binomial nomenclature, vertebrate, invertebrate, dichotomous key, hierarchy, habitat, biodiversity, taxonomy, Linnaean system, evolution, trait, adaptation, scientific name, conservation
Common misconceptions	**Electricity** Electricity is "used up" by components Batteries only give power to the components directly attached to it Brightness of a bulb is the same, regardless of series or parallel circuits Thicker wires have more resistance A switch only controls the component it is closest to Voltage and current are the same thing Electricity can "jump" across gaps in a circuit **Light** Light can bend around objects We can see without light Light only reflects from mirrors All shiny objects are mirrors Shadows only form in one shape or size Opaque materials can let light through Refraction and reflection are the same	**Circulatory system** Blood only flows through the heart and doesn't reach the entire body All organs work independently and are not connected Oxygen is stored in the body for long periods of time Carbon dioxide is bad and not needed in the body The heart only beats faster during exercise because the muscles are working harder A fast heart rate during exercise is harmful Taller people always have larger lung capacities Lung capacity does not change after childhood All fats and sugars are unhealthy Processed foods are always bad All drugs are harmful Only illegal drugs are dangerous Stimulants like energy drinks make you stronger or faster	**Evolution** All variation is caused by genetics Offspring are exact copies of their parents Evolution happens during an individual's lifetime Evolution is just a theory, so it's not proven Humans evolved from monkeys Extinction only happens because of human activity Extinct species like dinosaurs were failures Superbugs are a new type of germ Antibiotics can kill all germs, including viruses **Classification** All animals fit neatly into one group All living things are either plants or animals Classification is fixed and unchanging Size determines classification Vertebrates are more important than invertebrates Scientific names are random Classification keys are perfect and always lead to a clear answer Classification is only for animals Classification doesn't have a modern use
Working scientifically	Plan, enquiry, record, model, research, causal statements, predict		
SMSC	Spiritual – To know more and to wonder about the world. To look at the world in awe and wonder. Look for meaning and purpose in natural and physical phenomena. Have an awareness of the scale of living things from the small micro-organism to the largest. The interdependence of all living things and materials on Earth. Wonder at the vastness of space and the beauty of natural objects. Moral – To become increasingly curious. Consider the environment. Be open minded to the suggestion of others. Social – Group practical work. Teamwork and taking responsibility. Taking responsibility for their own and other people's safety. Begin to understand that science effects our lives. Begin to understand that science has a major effect on the quality of our lives Cultural – Begin to understand scientific discoveries by men and women in many cultures. Begin to understand how the environment and science are linked.		
Cultural Capital	Phizz Lab trip – Millbrook Primary School. British science week and World science day Poster competition – Harwell Science. Injury Minimisation Programme for Schools training Junior Citizens Trust activity day		

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Year 7	What are the scientific principles? **The children will focus on lab safety, increasing confidence and practical ability with a range of scientific equipment. The children will be able to make links with working scientifically from primary school.** • How do we keep safe in the lab? • What are variables in science? • What is meant by dependent, independent and control? • Can we use and draw graphs correctly to show our work? Chemistry - Can you separate particles? **The children will learn about the different properties of solids, liquids and gases through their understanding of particles.** • What are states of matter? • Why do states of matter have different properties? • What are changes of state? • What is diffusion? • What is solubility? • How to distill your own orange juice? • What is chromatography? • Can you obtain the greatest mass of pure salt? Chemistry – What is reactive chemistry? **The children will carry our practical experiments involving reacting acids with metals and carbonates. They will learn about acids and alkalis. They will use various indicators to test the pH of different substances.** • What are physical and chemical changes? • What is needed for combustion? • What happens when one of the key requirements is removed for combustion? • What is acid and alkali? • What is the pH scale and how is it used? • Can you make your own indicator? • What are neutralisation reactions? • Which antiacid tablet is the best?	Physics – (Forces) Can we use the density of an objects to predict if it will sink or float? **The children will measure force using a Newton metre. They will carry out a practical investigation to measure density. They will be introduced to speed, distance and time equation.** • What is a force? • Can you name some forces? • Can you measure force? • How do you use a newton metre? • Is friction a good thing? • What is density? • Can you work out the density of objects? • Using the density of an object, can you predict if it will sink or float? • What is the speed, distance, and time equation? Physics – (Solar system) Why is the moon so important to us on Earth? **The children will begin by learning about the scale of planets in our solar system. They will learn about the phases of the moon and different eclipses.** • Can you name the planets in our solar system? • What is the scale size of the planets? • Why do we have day/night and seasons? • Can you describe the phases of the moon? • Why is the moon important? • What are the different eclipses? • How do we conduct calculations that involve light years?	Biology – (Living things and the environment) – What are the pros and cons of selective breeding? **The children will be able to describe key features of different habitats. They will learn about selective breeding and look at predator prey relationships. They will begin to understand food webs and the pyramid of numbers.** • What is variation and classification? • What are the main groups of vertebrates? • Can you describe the key features of different habitats? • What is selective breeding? • What are the pros and cons of selective breeding? • Can you describe predator prey relationships? • Can you interpret a predator prey graph and give key features? E.g., What happens when the number of predators increases? • Can you interpret and create food webs? • What is a pyramid of numbers? Biology – (Cells) – What's in a cell? **The children will draw and label plant and animal cells as well as describe the functions of the labelled parts. They will prepare their own animal (cheek) cell and plant (onion) cell and, use a microscope to look closely. They will learn about specialised cells and mitosis.** • Can you draw and label the parts of an animal and plant cell? • Can you describe the functions of each part of a cell? • Using a microscope, can you describe what you can see? • What is a specialised cell? • How do specialised cells adapt to their functions? • What is mitosis? • How did you start out? • What is a fertilized egg cell?
Key Vocabulary	Variables, dependent, independent and control, graphs. Sates of matter – solid, liquid, gas, particles, changes of state, properties – shape and volume, diffusion, solubility, distillation, chromatography, mass, solute, solvent, solution Acid, alkali, reaction, carbonates, combustion, pH scale, indicator, substance, neutralisation reactions	Forces, newton metre, friction, density, speed, distance and time equation Solar system, names of planets, scale, day, night, seasons, phases of the moon – waxing crescent, first quarter, waxing gibbous, full moon, waning gibbous, third quarter, waning crescent, eclipses – total, partial, hybrid, annular, light years	Variation, classification, vertebrates, habitat, features, selective breeding, predator, prey, food chain, food web, pyramid of numbers Cells, plant cell, animal cell, nucleus, cell wall, cell membrane, cytoplasm, functions, microscope, specialised cells – red blood cell, sperm cell, egg cell, nerve cell, muscle cell, mitosis (cell division), fertilised
SMSC	Spiritual – To know more and to wonder about the world. To look at the world in awe and wonder. Look for meaning and purpose in natural and physical phenomena. Have an awareness of the scale of living things from the small micro-organism to the largest. The interdependence of all living things and materials on Earth. Wonder at the vastness of space and the beauty of natural objects. Moral – To become increasingly curious. Consider the environment. Be open minded to the suggestion of others. Scientific developments may give rise to moral dilemmas.		

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SUBJECT: Science

Vision: For children to show a passion for science and a curiosity for learning about the world around them through an exciting, engaging and challenging curriculum.

	Social – Group practical work. Teamwork and taking responsibility. Taking responsibility for their own and other people's safety. Understand that science has a major effect on the quality of our lives. Consider the benefits of scientific developments and begin to consider the social responsibility involved. Cultural – Scientific discoveries as a part of our culture. Scientific discoveries by men and women in many cultures. Environmental issues are central to science.