EQUALS TRUST

Science Curriculum v6

Science Curriculum Statement

Intent – What do we want for our children as Scientists?

At KPNS, Science is about developing the children's sense of enquiry and extending their knowledge and understanding of the world around them. We use a range of teaching methods in science lessons, with an emphasis on providing a curriculum which develops and extends the children's scientific concepts and enables them to be curious about the world. The children learn to work as scientists, asking scientific questions, using precise scientific vocabulary and planning and undertaking practical investigations. Science is taught through specific subject lessons and cross curricular topics. Wherever possible, links are made between science and other subjects, particularly literacy, maths, DT and ICT.

At KPNS, we aim to:

- to develop pupils' enjoyment and interest in science and an appreciation of its contribution to all aspects of everyday life (science fair, topic driven science)
- to build on pupils' curiosity and sense of awe of the natural world to deliver engaging and effective science lessons
- to link science with other curriculum areas to fully maximise learning opportunities and promote mastery (linked with English & VIPERS when the topic driver)
- to develop a solid knowledge of the science contained within the programmes of study of the National Curriculum and beyond.
- To build cultural capital and ispire children by developing a knowledge and appreciation of the contributions made by famous as well as familiar scientists (local scientist visits during our annual science week and visits to BGS)
- to encourage pupils to relate their scientific studies to applications and effects within the real world
- to develop creative thinking and curiosity.
- Provide a relevant, challenging and enjoyable Science Curriculum which is progressive in vocabulary, skills and knowledge
- Provide opportunities for co-operative working.

Implementation – How will we carry out our vision?

We will implement our vision by teaching through a 'Scientific Lens'. As scientists, children will be taught to use scientific vocabulary, make predictions, ask question, observe, measure, investigate, report, conclude and evaluate.

Thinking like a scientist, children and teachers ask questions such as…

I wonder why this happens/ that changes, I can see…/I noticed…
How can you find... a pattern, a similar or different answer, proof, another variable?
I wonder if... I can change this/ this happens every time/ can find a similar pattern?
What happens if...I add/ I change/ I see/I use?
Do you think... we will always get this answer/ you can prove your idea/ you can change something/ this will always happen?
What does this tell us about.....?
How can I show my findings/ record the results/ measure?
Why... does this happen/ does it change/ is it similar or different?
What have I found out? What can I conclude from this?
What will I do next time?

Planning:

- All planning should be on the KPNS Topic planning format and is driven by a '**big idea'. Skills, knowledge and vocabulary** are clearly identified, and lesson planning is supported by the use of key scientific enquiry questions with opportunities for spaced retrieval practice. '**Plan unit plans' are used to support the planning process.**
- Knowledge organisers support teaching and learning and are similarly structured around the subject driver 'big idea' and key scientific enquiry questions that the children should know and remember at the end of a unit.
- A topic cover page should be stuck at the start of each topic and show the topic title, relevant image and have a small space for a short cold task (allows pupils to show prior learning- see WAGOLL below).
- For hot tasks in science, a blank knowledge organiser is used to assess what pupils know and have remembered.
- The scientific lens for each lesson should be identified along with any questions that probe that lens.
- All planning should be uploaded onto AllStaff at the start of every half term.
- A cross-curricular approach to planning topic with clear skills and knowledge taught, detailed in line with the '**Thinking like a Scientist; what, where, when'** and the '**Science recording and reporting'** document. for KS1 this should be informed by the Chris Quigley skills and for KS2 this should be Cornerstones Essential skills.
- At least one written investigation should be recorded per unit, see year group recording expectations below.
- Enrichment opportunities to promote cultural capital and British Values should be carefully planned and implemented through hooks for the start of the topic, trips, visitors and links with the local community.

Inclusion:

Teachers set high expectations for all pupils. They will use appropriate assessment to set ambitious targets and plan challenging work for all groups, including:
-more able pupils, pupils with low prior attainment, pupils from disadvantaged backgrounds, pupils with SEND, pupils with English as an additional language (EAL).
Further information can be found in our statement of equality information and objectives, and in our SEND policy and information report.

Impact – How will we assess what the children know, remember and understand?

Teachers will monitor the impact of their teaching using:

- AFL during lessons
- **Spaced retrieval** activities embedded into planning and practise.
- **Knowledge organiser** based hot tasks at the end of each topic to assess what knowledge has been remembered and what skills have been mastered.

The Subject Leaders monitor the way their subject is taught throughout the school by looking at the intent, implementation and impact using:

- Planning scrutiny and book dips to evaluate impact of the big ideas and key questions.
- Pupil Interviews/ learning walks; assess impact of spaced retrieval, what is known and remembered.?
- External and internal moderation for QA and to share best practise.
- SIL and Governor visits to monitor provision and provide next steps
- Planning and delivering CPD

The Subject Leaders also have responsibility for resources; storage and management. All monitoring information is used by the Subject Leaders to ensure our provision and pupil outcomes are the very best they can be. Any next steps to move the subject and children's learning forward are fed into the Subject Leader's monitoring and action plans, which form part of the whole school improvement plan.
Governors monitor whether the school is complying with its finding agreement and teaching a 'broad and balanced curriculum' which includes the required subjects through:

- Governor monitoring visits, the Head Teacher repots and the School Development Plan.

Elements of our Science Curriculum

Knowledge and Understanding

Scientists develop:

- a knowledge and understanding of scientific concepts across the three disciplines of biology, chemistry and physics

- a knowledge and understanding of the nature, processes and methods of science (working scientifically)

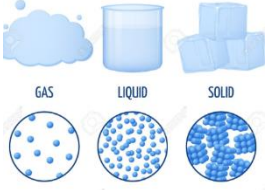
- a scientific vocabulary that includes both: high utility tier 2 words in a scientific context (such as energy) and tier 3 words that are domain specific (such as photosynthesis, evaporation)

Plants	**Living things and their habitats**	**Animals including humans**	**Evolution and inheritance**
Seasonal changes	**Materials**	**Rocks**	**Light**
Forces	**Sound**	**Electricity**	**Earth and space**

Working Scientifically

Asking questions and hypothesising	**Observing and measuring**	**Undertaking practical enquiry to answer questions**
Recording and presenting evidence	**Answering questions and concluding**	**Evaluating and raising further questions**

Science Overview

	Autumn Term		Spring Term		Summer Term	
EYFS Cycle A	Marvellous Me! 	Long Ago! 	Books, Books, Books! 	Creep, Crawl, Wriggle 	Let it Grow 	On the Beach 
EYFS Cycle B	Super Me! 	Let's Celebrate 	Once Upon a Time 	Build it up! 	Big Wide World 	Animal Kingdom 
Year 1	Animals including humans – body and senses 	Materials 	Animals including humans – animal groups 		Plants and Animals 	
	Seasonal Changes 					
Year 2	Plants 	Animals including humans 	Materials 		Living things and their habitat. 	
Year 3	Animals Including Humans 	Rocks 	Light 	Forces and Magnets 	Plants and Animals 	
Year 4	Living things and their habitats 	Sound 	Electricity 	Animals including humans and teeth. 	States of matter 	

Year 5	Materials 	Change in materials 	Earth and Space and Forces 	Forces 	Living things and their habitats 	Animals Including Humans 
Year 6	Electricity 	Light 	Living things and their habitat. 	Animals including humans (including heart) 		Evolution and Inheritance (including classification). 
Y5/6- All animals including humans covered by DART bianullay during the Autumn Term and JigSaw ongoing.						

The 'Big Ideas'

	Autumn Term		Spring Term		Summer Term	
EYFS Cycle A	**Marvellous Me!** *Where do rockets go?* *What does an engineer do?* *How do we power machines?*	**Long Ago!** *What is a museum?* *What does extinct mean?*	**Books, Books, Books!** *What can we bake?* *How do we stay healthy?* *Why are fruit and vegetables good for us?*	**Creep, Crawl, Wriggle** *What is a minibeast?* *What is the life cycle of a butterfly?* *What are the signs of spring?*	**Let it grow,** *What do plants need to grow?* *What job do worms do?* *How do trees change?*	**On the Beach** *How do we stay safe in the sun?* *When is the best time of year to visit the beach?*
EYFS Cycle B	**Super Me!** *Can you name a part of the body?* *What does a magnet do?* *What is it like in foundation?*	**Let's Celebrate** *What is my favourite food?* *What does Winter feel like?*	**Once Upon a Time** *How do we make pancakes?*	**Build it up!** *What is a house made of?* *What are the signs of spring?* *What does an architect do?*	**Big Wide World** *How do people travel?* *What can float?*	**Animal Kingdom** *How do we care for animals?* *What does an animal look like?*
Year 1	**Animals including humans – body and senses.** *What are the 5 senses and how*	**Materials** *What's it made of?*	**Animals including humans – animal groups.** *What animals are there and what do they eat?*		**Plants and Animals** *What is a plant?*	*Consolidation of knowledge and focus on working scientifically skills.*

	do we use them?					
	Seasonal Changes *What are the four seasons and what are they like?*					
Year 2	**Plants** *How do plants grow?*	**Animals including humans** *How do animals survive?*	**Materials** *Which material and why?*		**Living things and their habitat.** *What is a habitat and how does it help animals to survive?*	
Year 3	**Animals Including Humans** *What do we need to survive and how do our bodies help?*	**Rocks** *How do rocks differ from one another?*	**Light** *Where do light sources come from and how do they help us see?*	**Forces and Magnets** *What are forces and magnets?*	**Plants and Animals** *How do plants survive and reproduce?*	
Year 4	**Living things and their habitats** *How do we classify things?*	**Sound** *Why do we hear sound?*	**Electricity** *What is electricity?*	**Animals including humans and teeth.** What happens when we eat?	**States of matter** *What is a solid, liquid and gas?*	
Year 5	**Properties of Materials** *How do we decide which materials are suitable for a chosen purpose?*	**Change in Materials** Can materials change state? If so, can they change back?	**Earth and Space** *What is in our solar system?*	**Forces** *What are the different forces acting on our world?*	**Living things and their habitats** *How do animals change during their life cycle?*	**Animals including humans** How do the life cycles of living things compare**?**
Year 6	**Electricity** *How do we measure changes in electricity?*	**Light** *How does light reach our eyes?*	**Living things and their habitat.** *How are animals adapted to where they live?*	**Animals including humans** *How does our heart keep us alive?*		**Evolution and Inheritance** *How do living things change over time to survive?*

Thinking like a scientist As scientists, children will be taught to use the language and terminology of science and to explore and investigate different scientific phenomena in the world around us, share and record our findings.

Teaching children to think like a historian requires creating a **scientific lens** by teaching all of these concepts within a unit.

What we teach, where we teach it and when we teach it? (vocabulary & knowledge)

Vocabulary and Lens Strand Progression							
Subject Content	EYFS	Y1	Y2	Y3	Y4	Y5	Y6
Animals incl. humans; Biology	Body, plant, animal Can talk about some of the things they have observed such as plants, animals, natural and found objects. Shows care and concern for living things and the environment. Explore and make observations of the world around them Ask questions about what they have observed Suggest possible answers to questions Looks closely at similarities, differences, patterns and change Group together similar objects	Living things need to be cared for in order for them to survive. They need water, food, warmth and shelter. Label and describe the basic structure of a variety of common animals. Different animal groups have some common body parts, such as eyes and a mouth, and some different body parts, such as fins or wings. Group and sort a variety of common animals based on the foods they eat. Label the human body Name and explore the 5 senses	offspring, adult, life cycle, temperature, hygiene, exercise A healthy lifestyle includes exercise, good hygiene and a balanced diet. Hand washing and good hygiene are important parts of a healthy lifestyle and prevent the spread of germs. Human offspring go through different stages as they grow to become adults. These include baby, toddler, child, teenager and adult. Animals need water, food, air and shelter to survive. Their habitat must provide all these things. Compare and group things that are living, dead or have never been alive.	vitamin, balanced diet, cartilage, invertebrate, contract, loosen, ribcage, insect Identify and group animals that have no skeleton, an internal skeleton (endoskeleton) and an external skeleton (exoskeleton). Humans have to get nutrition from what they eat. It is important to have a balanced diet made up of the main food groups, including proteins, carbohydrates, fruit and vegetables, dairy products and alternatives, and fats and spreads. Humans need to stay hydrated by drinking water. Compare and contrast the diets of different animals. Humans have a skeleton and muscles for movement, support and protecting organs. Major bones in the human body include the skull, ribs,	digestion, excretion, anus, small intestine, large intestine, stomach, rectum, esophagus, tongue, saliva, acid, bile, enzymes, incisors, canines, molars, predator, prey, producer, consumer, primary, secondary, tertiary Identify the four different types of teeth in humans and other animals, and describe their functions. Regular teeth brushing, limiting sugary foods and visiting the dentist are important for good oral hygiene. The digestive system is responsible for digesting food and absorbing nutrients and water. The main parts of the digestive system are the mouth, oesophagus, stomach, small intestines, large intestines and rectum.	embryo, womb, adolescence Good personal hygiene (washing, wearing clean clothes and teeth brushing) can prevent disease or illness. Puberty is the period during which adolescents reach sexual maturity and become capable of reproduction. It causes physical and emotional changes. Humans reproduce sexually, which involves two parents (one female and one male) and produces offspring that are different from the parents. Sometimes people need IVF to help them have a baby Humans go through characteristic stages as they develop to old age. These stages include baby, infant, toddler, child, adolescent, young adult, adult and senior citizen. Puberty is the transition between childhood and adulthood.	artery, aorta, atrium, blood vessels capillary, circulatory system, vein, pulse, ventricle, replenished, resting heart rate, body Lifestyle choices can have a positive (exercise and eating healthily) or negative (drugs, smoking and alcohol) impact on the body. The circulatory system includes the heart, blood vessels and blood. There are three types of blood vessel: arteries, veins and capillaries. They each have a different-sized holes and walls. The blood carries gases (oxygen and carbon dioxide), water and nutrients to where they are needed. The red blood cells carry oxygen and carbon dioxide), water and nutrients to where they are needed. The red blood cells carry oxygen and carbon dioxide around the body. The blood also contains white blood cells, which protect the body from infection.

				spine, humerus, ulna, radius, pelvis, femur, tibia and fibula. Major muscle groups in the human body include the biceps, triceps, abdominals, trapezius, gluteals, hamstrings, quadriceps, deltoids, gastrocnemius, latissimus dorsi and pectorals.			Explain that the circulatory system in animals transports oxygen, water and nutrients around the body. The role of the circulatory system is to transport oxygen, water and nutrients around the body. They are transported in blood and delivered to where they are needed.
Subject Content	EYFS	Y1	Y2	Y3	Y4	Y5	Y6
Animals inc Humans, Living things and their habitats;	seasons, weather, life cycle, grow, change, healthy, unhealthy, plants and animals Can talk about some of the things they have observed such as plants, animals, natural and found objects. Explore and make observations of the world around them Ask questions about what they have observed Suggest possible answers to questions Looks closely at similarities, differences, patterns and change Group together similar objects	fish, amphibian, reptile, bird, mammal, offspring, carnivore, herbivore, omnivore, vertebrate, invertebrate All living things (plants and animals) change over time as they grow and mature. Identify, compare, group and sort a variety of common animals, including fish, amphibians, reptiles, birds and mammals, based on observable features.	birth, dead, life cycle, food chain, source, nutrients, reproduction, consumption, environment Living things are those that are alive. Dead things are those that were once living but are no longer. Some things have never been alive. Identify and name a variety of plants and animals in a range of habitats and microhabitats. Describe the basic life cycles of some familiar animals (egg, caterpillar, pupa, butterfly; egg, chick, chicken; spawn, tadpole, froglet, frog). Describe a range of local habitats and habitats beyond their locality.		kingdom, classification key, species, fungi, bacteria, climate change, characteristics, offspring, extinction, pollution Compare, sort and group living things in a variety of ways based on observable features and behaviour. Habitats change over time, either due to natural or human influences. These changes can pose a risk to animals and plants that live in the habitat. An adaptation helps an animal or plant survive in its habitat. If living things are unable to adapt to changes within their habitat, they are at risk of becoming extinct. Carnivores, herbivores and omnivores have characteristic types of tooth. Herbivores have many large molars for grinding plant material. Carnivores have large	life cycle, life span, embryo, metamorphosis, pupa, larva, chrysalis, caterpillar, tadpole, hatchling, fledgling, insect A life cycle is the series of changes in the life of a living thing and includes these basic stages: birth, growth, reproduction and death. Mammals' life cycles include the stages: embryo, baby, adolescent and adult. Amphibians' life cycles include the stages: egg, larva (tadpole), adolescent and adult. Some insects' Reproduction is the process of producing offspring and is essential for the continued survival of a species. There are two types of reproduction: sexual and asexual. Sexual reproduction involves two parents (one female and one male) and produces offspring that are different from the parents. Asexual reproduction involves one parent and	arthropod, arachnid, antenna, jointed limbs Research unfamiliar animals and plants from a range of habitats, deciding upon and explaining where they belong in the classification system. Living things are classified into groups, according to common observable characteristics and based on similarities and differences. Insulation is important for the survival of many animals. Blubber is a layer of fat that acts as an insulator under the skin of some animals, such as walruses and whales. It is an adaptation that is essential for their survival. Animals with fur, such as polar bears and Arctic foxes, trap a layer of air close to their skin to insulate them from the cold. Environmental factors can affect the distribution of

					canines for killing and tearing meat. Construct and interpret a variety of food chains and webs to show interdependence and how energy is passed on over time.	produces offspring that is identical to the parent.	living things within a habitat. These factors include light (intensity and duration), weather, altitude, soil type and humans, such as when we mow or trample grass.
SubjectContent	EYFS	Y1	Y2	Y3	Y4	Y5	Y6
Materials, Rocks, States of matter Physics, Earth Sciences, Chemistry Biology	Hard,soft rough,smooth Shiny,cold,wet,dry Identify and name objects and discuss differences in materials and the changes they notice.	absorption, property, wood, plastic, glass, metal, water, rock Identify and name what an object is made from, including wood, plastic, glass, metal, water and rock. Investigate and describe the simple physical properties of some everyday materials, such as hard or soft; stretchy or stiff; rough or smooth; opaque or transparent; bendy or rigid; waterproof or not waterproof. Compare and group materials in a variety of ways, such as based on their physical properties; being natural or man-made and being recyclable or non-recyclable.	conductor, brick, paper, cardboard, friction, movement, suitability, surface, stretch, twist, waterproof, deformation, flexible, rigid Observe what happens when a range of everyday materials, including foods, are heated and cooled, sorting and grouping them based on their observations. Compare the suitability of a range of everyday materials for particular uses. A material's physical properties make it suitable for particular purposes, such as glass for windows and brick for building walls. Many materials are used for more than one purpose, such as metal for cutlery and cars.	extinction, igneous, metamorphic, sedimentary, paleontologist, weathering, molten rock, crust, tectonic plates, scavengers, fossil Investigate soils from the local environment, making comparisons and identifying features. Compare and group rocks based on their appearance, properties or uses. Describe simply how fossils are formed, using words, pictures or a model.	condensation, evaporation, reversible, boiling point, melting point, liquid, gas, thermometer, water cycle, continuous precipitation, transpiration Describe the water cycle using words or diagrams and explain the part played by evaporation and condensation. Materials can be grouped according to whether they are solids, liquids or gases.	irreversible, dissolve, soluble, insoluble, solvent, solute, solution, filter, sieve, saturation, crystallization, thermal, chemistry Reversible changes include heating, cooling, melting, dissolving and evaporating. Irreversible changes include burning, rusting, decaying and chemical reactions. Some mixtures can be separated by filtering, sieving and evaporating. Sieving can be used to separate large solids from liquids and some solids from other solids. Filtering can be used to separate small solids from liquids. Evaporating can be used to separate dissolved solids from liquids. Compare and group everyday materials by their properties, including hardness, solubility, transparency, conductivity (electrical and thermal) and magnetism. Materials can be grouped according to their basic physical properties. Properties include hardness,	

						solubility, transparency, conductivity (electrical and thermal) and magnetism. Investigate and identify good thermal insulators, describing their common features.	
Subject Content	EYFS	Y1	Y2	Y3	Y4	Y5	Y6
Green plants; Biology Green plants; Biology	life cycle, grow, change, plants, fruit, vegetable, root, shoot Identify different types and key features of plants eg flower, tree, grass, leaf , root To identify key features of the life cycle of a plant through exploring how seeds and bulbs grown	Energy, growth, deciduous, evergreen, flower, plant, tree, structure, roots, stem, leaf, trunk, flower Identify, compare, group and sort a variety of common plants, including deciduous and evergreen trees, based on observable features Label and describe the basic structure of a variety of common plants. The basic plant parts include root, stem, leaf, flower, petal, fruit, seed and bulb. Trees have a woody stem called a trunk.	bulb, seed Plants need air, light, water, minerals from the soil and room to grow, in order to survive. Different plants have different needs depending on their habitat. Plants grow from seeds and bulbs. Describe how plants need water, light and a suitable temperature to grow and stay healthy. Plants need water, light and a suitable temperature to grow and stay healthy. Without any one of these things, they will die.	extinction, fruit, nectar, anther, ovary, ovule, petal, pollen, stigma, style, stamen, function, exchange, dispersal, fertilization Flowers are important in the life cycle of flowering plants. The stages of a plant's life cycle include germination, flower production, pollination, fertilisation, seed formation and seed dispersal. Insects and the wind can transfer pollen from one plant to another (pollination). Name and describe the functions of the different parts of flowering plants (roots, stem, leaves and flowers). Investigate how water is transported within plants. Water is transported in plants from the roots, through the stem and to the leaves, through tiny tubes called xylem.		stamen, filament, anther, pollen, carpel, stigma, style, ovary, ovule and sepal Group and sort plants by how they reproduce. Label and draw the parts of a flower involved in sexual reproduction in plants (stamen, filament, anther, pollen, carpel, stigma, style, ovary, ovule and sepal).	
Subject Content	EYFS	Y1	Y2	Y3	Y4	Y5	Y6

Forces & Magnets; Physics	Floating, sinking, bend, push,pull Explore and make observations about different forces. For exampling floating and sinking in the water tray, push toys, guttering tubes and balls			magnetic, non-magnetic, pole, north, south, sliding friction, static friction, elastic, resist, attraction, repulsion An object will not move unless a pushing or pulling force is applied. Some forces require direct contact, whereas other forces can act at a distance, such as magnetic force. Magnets have two poles (north and south). Opposite poles (north and south) attract each other, while like poles (north and north, or south and south) repel each other. Some materials have magnetic properties. Magnetic materials are attracted to magnets. All magnetic materials are metals but not all metals are magnetic. The metal iron is magnetic.		acceleration, air resistance, buoyancy, effort, force meter, fulcrum, gravity, load, mass, mesh, Newton, pivot, rigid, streamlined, terminal velocity, unsupported, water resistance, weight Gravity is a force of attraction. Anything with a mass can exert a gravitational pull on another object. The Earth's large mass exerts a gravitational pull on all objects on Earth, making dropped objects fall to the ground. Mechanisms, such as levers, pulleys and gears, give us a mechanical advantage. A mechanical advantage is a measurement of how much a simple machine multiplies the force that we put in. The bigger the mechanical advantage, the less force we need to apply.	
Subject Content	EYFS	Y1	Y2	Y3	Y4	Y5	Y6
Seasonal Changes; Biology / Physics Light and Dark; Physics	spring, summer, autumn, winter , hot, cold There are four seasons: spring, summer, autumn and winter. Certain changes happen in the environment in different seasons including observations about the weather.	freezing, melting, reflection, Sun, clouds, wind, snow, ice, spring, summer, autumn, winter , temperature, thermometer The Earth is spherical and is covered in water and land. When it is daytime in one location, it is night time on the other side of the world. The UK has typical weather in each of the		wave, mirror, incident ray, image, beam, photons, solid, opaque, transparent, object, source, data logger Light from the Sun is damaging for vision and the skin. Protection from the Sun includes sun cream, sun hats, sunglasses, staying indoors or in the shade.		angle of incidence, angle of reflection, refraction, spectrum, translucent, medium, periscope The Sun, Earth, Moon and other planets and stars are roughly spherical. All planets are spherical because their mass is so large that they have their own force of gravity. This force of gravity pulls all of a	Light travels in straight lines. Light sources give out light. They can be natural or artificial. When light hits an object, it is absorbed, scattered, reflected or a combination of all three. Light from a source or reflected light enter the eye. Vertebrates, such as mammals, birds and

		seasons. For example, winter is cold and sometimes frosty, whereas summer is warm and sometimes sunny. There are four seasons: spring, summer, autumn and winter. Certain events and weather patterns happen in different seasons. Different types of weather include sun, rain, hail, wind, snow, fog, lightning, storm and cloud. Day length (the number of daylight hours) is longer in the summer months and shorter in the winter months. Observe the local environment throughout the year and ask and answer questions about seasonal change. The local environment is a habitat for living things and can change during the seasons.		Dark is the absence of light and we need light to be able to see. A shadow is formed when light from a light source, such as the Sun, is blocked by an opaque object. Transparent objects allow light to pass through them and do not create shadows. Shadows change shape and size when the light source moves. For example, when the light source is high above the object, the shadow is short and when the light source is low down, the object's shadow is long. Light can be reflected from different surfaces. Some surfaces are poor reflectors, such as some fabrics, while other surfaces are good reflectors, such as mirrors. Group and sort materials as being reflective or non-reflective		planet's material towards its centre, which compresses it into the most compact shape – a sphere. The sun's movement through the sky is due to the Earth rotating and not the Sun moving. Earth rotates to the east or, if viewed from above the North Pole, it rotates anti-clockwise, which means the Sun rises in the east and sets in the west. As Earth rotates, different parts of it face the Sun, which brings what we call daytime. The part facing away is in shadow, which is night time.	reptiles, have a cornea and lens that refracts light that enters the eye and focuses it on the nerve tissue at the back of the eye, which is called the retina. A shadow appears when an object blocks the passage of light. Apart from some distortion or fuzziness at the edges, shadows are the same shape as the object. The distortion or fuzziness depends on the position or type of light source.
Subject Content	EYFS	Y1	Y2	Y3	Y4	Y5	Y6
Electricity; Physics					circuit, appliance, charge, electron, battery, cell, bulb, buzzer, switch, wire, current electricity, static electricity, negative, positive		series circuit, parallel circuit, resistance, voltage Voltage is measured in volts (V) and is a measure of the difference in 'electrical energy' between two parts of a circuit. The bigger the voltage, the

					Explain the precautions needed for working safely with electrical circuits. Describe materials as electrical conductors or insulators. Compare common household equipment and appliances that are and are not powered by electricity. Predict and describe whether a circuit will work based on whether or not the circuit is a complete loop and has a battery or cell. Construct operational simple series circuits using a range of components and switches for control.		more electrons are pushed through the circuit. The more voltage flowing through a lamp, buzzer or motor, the brighter the lamp, the louder the buzzer and the faster the motor. There are recognised symbols for different components of circuits.
Earth & The Solar System; Earth Sciences	JUST YEAR 5 planet, satellite, sphere, solar system, eclipse, star, universe, constellation, axis, celestial body, Moon, rotating, lunar, solar, telescope, rotation The Solar System is made up of the Sun and everything that orbits around it. There are eight planets in our Solar System: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. Earth orbits around the Sun and a year (365 days) is the length of time it takes for Earth to complete a full orbit. The Moon orbits Earth, completing a full orbit every month (28 days).						
Inheritance and evolution; Biology	JUST YEAR 6 evolution, natural selection, variation, advantageous Identify that living things produce offspring of the same kind, although the offspring are not identical to either parent. Animals that sexually reproduce generate new offspring of the same kind by combining the genetic material of two individuals. Describe how animals and plants can be bred to produce offspring with specific and desired characteristics (selective breeding). Animals and plants can be bred to produce offspring with specific and desired characteristics. This is called selective breeding. Examples include cows that produce large quantities of milk or crops that are disease-resistant.						
Sound, Physics	JUST YEAR 4 particle, vibration, percussion instrument, wind instrument, string instrument, frequency, volume, pitch, transverse wave, longitudinal wave, medium, vacuum When an instrument is played, the air around or inside it vibrates. These vibrations travel as a sound wave. Sound waves travel through a medium, such as air or water, to the ear. Pitch is how high or low a sound is. Parts of an instrument that are shorter, tighter or thinner produce high-pitched sounds. Parts of an instrument that are longer, looser or fatter produce low-pitched sounds. Volume is how loud or quiet a sound is. The harder an instrument is hit, plucked or blown, the stronger the vibrations and the louder the sound.						

Progression for WORKING SCIENTIFICALLY; Recording & Reporting

NB - The National Curriculum statements in italics in these tables indicate that they feature more than once.

EYFS	Year 1 & 2	Year 3 & 4	Year 5 & 6
Asking questions and recognising that they can be answered in different ways			
Asking questions about what they have observed. • While exploring the world, the children develop their ability to ask questions (such as: what something is, how things are similar and different, why things happen and how things work). Where appropriate, they will suggest possible answers to these questions. • The children answer questions developed with the teacher often through modelling.	**Asking simple questions and recognising that they can be answered in different ways.** • While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Where appropriate, they answer these questions. • The children answer questions developed with the teacher often through a scenario. • The children are involved in planning how to use resources provided to answer the questions using different types of enquiry, helping them to recognise that there are different ways in which questions can be answered.	**Asking relevant questions and using different types of scientific enquiries to answer them.** • The children consider their prior knowledge when asking questions. They independently use a range of question stems. Where appropriate, they answer these questions. • The children answer questions posed by the teacher. • Given a range of resources, the children decide for themselves how to gather evidence to answer the question. They recognise when secondary sources can be used to answer questions that cannot be answered through practical work. They identify the type of enquiry that they have chosen to answer their question.	***Planning different types of scientific enquiries to answer questions, including recognising and controlling variables, where necessary*** • Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. • Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work.

Application in related substantive context			
What is this? Encourage description, e.g. green, living, part of a plant.	**Use KS1 investigation planning sheet to aid question formation.** Eg. How are these animals the same and how are they different? (sorting into classification groups)	**Use Post-it Pete investigation planning sheet to aid question formation.** Eg. Ask questions about how objects move on different surfaces.	**Use UKS2 investigation planning sheet to aid question formation.** Eg. Plan to investigate properties of different materials in order to recommend materials for particular functions depending on these properties e.g. test waterproofness and thermal insulation to identify a suitable material for clothing.

EYFS	Year 1 & 2	Year 3 & 4	Year 5 & 6
Making observations and taking measurements			
Explore and make observations of the natural world around them • Children explore the world around them and are encouraged to talk about what they see/notice. They make observations to support identification, comparison and noticing change. • Teachers model observational and investigational skills – for example, asking aloud: "I wonder what will happen if…"	**Observing closely, using simple equipment** • Children explore the world around them. They make careful observations to support identification, comparison and noticing change. They use appropriate senses, aided by equipment such as magnifying glasses or digital microscopes, to make their observations. • They begin to take measurements, initially by comparisons, then using non-standard units.	**Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers** • The children make systematic and careful observations. • They use a range of equipment for measuring length, time, temperature and capacity. They use standard units for their measurements.	**Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate** • The children select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel, force meter with a suitable scale. • During an enquiry, they make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value).

Application in related substantive context			
Observe seasonal change; Observe properties of materials – I wonder what will happen if we pour water on this?	**Use non-standard units to measure** Eg. Y1, using cubes to measure who has the longest feet. Using a pictogram to represent different eye colours in the class. Y2, making comparisons using the words 'longer' or 'shorter', using language such as 'less absorbent' and 'more absorbent' to draw comparisons.	**Use standard units of time, length, capacity and temperature to measure** Eg. Y3, measuring the growth of a plant over a series of weeks using cm. Y4, measuring the distance at which a certain sound can be heard using whole meters.	**Select measuring equipment to suit purpose and use standard units of measure (g/kg, N, Celsius, milliseconds/seconds/minutes, ml/l, mm, cm, m)** **Children use UKS2 planning sheet to design their own methods and select appropriate units of measurement.** Eg. Y5, measuring to the nearest millisecond when timing how long an object takes to fall whilst investigating gravity. Using Newtons to measure forces. Y6, creating a table and line graph to show measurement of different sized shadows in cm, based on distance away from a light source.

EYFS	Year 1 & 2	Year 3 & 4	Year 5 & 6
Engaging in practical enquiry to answer questions			
Exploring and enquiring • The children use practical resources provided to explore and enquire (sand/water, construction, cooking, outdoor play, garden, small world). • Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function. • Children use observations to group together similar objects and consider differences, patterns and change.	**Performing simple tests** • The children use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. They carry out: tests to classify; comparative tests; pattern seeking enquiries; and make observations over time. **Identifying and classifying** • Children use their observations and testing to compare objects, materials and living things. They sort and group these things, identifying their own criteria for sorting. • They use simple secondary sources (such as identification sheets) to name living things. They describe the characteristics they used to identify a living thing.	**Setting up simple practical enquiries, comparative and fair tests** • The children select from a range of practical resources to gather evidence to answer questions generated by themselves or the teacher. • They follow their plan to carry out: observations and tests to classify; comparative and simple fair tests; observations over time; and pattern seeking. **Explanatory note** *A comparative test is performed by changing a variable that is qualitative* *e.g. the type of material, shape of the parachute. This leads to a ranked outcome.* *A fair test is performed by changing a variable that is quantitative e.g. the thickness of the material or the area of the canopy. This leads to establishing a causative relationship*.	***Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary*** • The children select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time and for how long. They look for patterns and relationships using a suitable sample.

Application in related substantive context			
Eg. Experiment with floating and sinking objects.	**Use KS1 investigation sheet to aid enquiry planning.** **Children participate in discussions guided by teacher to generate enquiry.** **All children complete the same investigation.** Eg. Test properties of materials, such as absorbency, strength, stiffness. Explore the effect of exercise on the human body – observe changes in peers.	**Use Post-it Pete investigation sheet to aid enquiry planning.** **Children design and plan a range of potential investigations.** **All children complete the same investigation to answer an enquiry question.** Eg. Explore how shadows vary as the distance between a light source and an object or surface is changed. Explore how objects move on different surfaces e.g. spinning tops/coins, rolling balls/cars, clockwork toys, soles of shoes etc.	**Use UKS2 investigation sheet to aid enquiry planning.** **Children select own variables to test an area of investigation, with some guidance from an adult.** **Children can choose their own enquiry questions and design their own investigations.** Eg. Carry out comparative and fair tests involving non-reversible changes e.g. What affects the rate of rusting? Investigate how long does it take my pulse rate to return to my resting pulse rate (recovery rate)

EYFS	Year 1 & 2	Year 3 & 4	Year 5 & 6
Recording and presenting evidence			
Sorting and recording data to help in answering questions • The children record their observations and learning e.g. draw pictures of animals and plants**.** They group together similar objects (for example, sorting rings)	**Gathering and recording data to help in answering questions** • The children record their observations e.g. using photographs, videos, drawings, labelled diagrams or in writing. • They record their measurements e.g. using prepared tables, pictograms, tally charts and block graphs. • They classify using simple prepared tables and sorting rings.	**Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions** **Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables** • The children sometimes decide how to record and present evidence. They record their observation e.g. using photographs, videos, pictures, labelled diagrams or writing. They record their measurements e.g. using tables, tally charts and bar charts (given templates, if required, to which they can add headings). • Children are supported to present the same data in different ways in order to help with answering the question.	**Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs** • The children decide how to record and present evidence. They record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. They record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs. They record classifications e.g. using tables, Venn diagrams, Carroll diagrams and classification keys. • Children present the same data in different ways in order to help with answering the question.

Application in related substantive context			
Eg. Draw pictures of animals appropriate to different settings/ habitats	**Use KS1 investigation sheet to aid recording of results.** **Use: Tally charts, labelled diagrams, simple tables, pictograms and written description.** Eg. Y1, Draw labelled diagrams of the key parts of the human body. Simple table to record the features of different animals. Y2, Draw labelled diagram of the key parts of a plant. Sorting materials based on simple properties.	**Use LKS2 investigation sheet to aid recording of results.** **Use: Bar charts, tables, Venn diagrams, Carroll diagrams, classification keys, sound maps, flow charts.** Eg. Y3, Venn diagram to show the different diets of animals and identify omnivores. Bar chart used to show how far a toy car travels along different surfaces. Y4, Venn diagram to show which animals can swim, fly or both. Classification key for different animals. Sound map to show where in the outside environment a sound is coming from. Flow chart for processes in the digestive system.	**Use UKS2 investigation sheet to aid recording of results.** **Use: detailed tables, line graphs, pie charts.** Eg. Y5, More advanced table to show results of different variables and conditions, such as the properties of different materials. Line graph to show the effectiveness of different materials as thermal insulators. Y6, More accurate diagrams of circuits. Animal classification in a detailed table. Line graph to show the size of a shadow based on the object's distance from a light source.

EYFS	Year 1 & 2	Year 3 & 4	Year 5 & 6
Answering questions and concluding			
Using their experiences to suggest answers to questions • Children draw upon their experiences of the natural world around them, along with what has been read in class, to suggest possible answers to questions.	**Using their observations and ideas to suggest answers to questions** • Children use their experiences of the world around them to suggest appropriate answers to questions. They are supported to relate these to their evidence e.g. observations they have made, measurements they have taken or information they have gained from secondary sources. ***Using their observations and ideas to suggest answers to questions*** • The children recognise 'biggest and smallest', 'best and worst' etc. from their data.	**Using straightforward scientific evidence to answer questions or to support their findings.** • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. The answers are consistent with the evidence. **Identifying differences, similarities or changes related to simple scientific ideas and processes** • Children interpret their data to generate simple comparative statements based on their evidence. They begin to identify naturally occurring patterns and causal relationships. ***Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions*** • They draw conclusions based on their evidence and current subject knowledge	**Identifying scientific evidence that has been used to support or refute ideas or arguments** • Children answer their own & others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. When doing this, they discuss whether other evidence e.g. from other groups, secondary sources and their scientific understanding, supports or refutes their answer. • They talk about how their scientific ideas change due to new evidence that they have gathered. • They talk about how new discoveries change scientific understanding. ***Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations*** • In their conclusions, children: identify causal relationships and patterns in the natural world from

			their evidence; identify results that do not fit the overall pattern; and explain their findings using their subject knowledge.
Application in related substantive context			
Eg. Explain which animals live on a farm.	**Use KS1 investigation results sheet to aid conclusions.** Make observations with adult support to suggest answers to enquiry questions. Eg. Explain what materials are suited to different purposes, using the words 'most' or 'best' and 'least' or 'worst'. Explain what plants need to grow based on evidence gathered.	**Use LKS2 investigation results sheet to aid conclusions.** Draw conclusions and explain results with scaffolding and support from adults. Eg. Identify that some metals, but not all, are magnetic. Give reasons for choice of materials for making different parts of a switch in a circuit.	**Use UKS2 investigation results sheet to aid conclusions.** Explain the results from their investigations and use their test results to set up further comparative and fair tests. Use secondary sources and, where possible, first-hand observations. Eg. To find out about the life cycles of a range of animals.

EYFS	Year 1 & 2	Year 3 & 4	Year 5 & 6
Evaluating and raising further questions and predictions			
Using experiences of natural change to make predictions. • Children understand the predictability of seasonal change (weather, clothing, trees etc.)	**Using experiences of natural change and processes to make predictions.** • Children describe the predictability of seasonal change (weather, clothing, trees etc.) • They understand basic changes of state (ice, water, steam)	**Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions** • They identify ways in which they adapted their method as they progressed or how they would do it differently if they repeated the enquiry.	***Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations*** • They evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used. • They identify any limitations that reduce the trust they have in their data.
		Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • Children use their evidence to suggest values for different items tested using the same method e.g. the distance travelled by a car on an additional surface. • Following a scientific experience, the children ask further questions which can	**Using test results to make predictions to set up further comparative and fair tests** • Children use the scientific knowledge gained from enquiry work to make predictions they can investigate using comparative and fair tests.

		be answered by extending the same enquiry.	
Application in related substantive context			
Predict clothing/weather/ what the trees will look like for different seasons.	**Use KS1 investigation results sheet to evaluate.** Eg. Use results from properties of materials tests to select appropriate material for a purpose e.g. Which material is the best for a rain hat?	**Use LKS2 investigation results sheet to evaluate.** Eg. Make predictions for further tests regarding object movement on new surfaces e.g. it will spin for longer on this surface than that, but not as long as it spun on that surface. Present their learning about the water cycle in a range of ways e.g. diagrams, explanation text.	**Use UKS2 investigation results sheet to evaluate.** Predict results and answer questions by drawing on evidence gathered. Propose further questions based on investigation findings. Eg. Compare two or more life cycles they have studied. Identify characteristics that will make a plant or animal suited or not suited to a particular habitat. Predict and explain, with diagrams or models as appropriate, how the shape of shadows can be varied.

National Curriculum Coverage for Science

	WS DRIPS	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
EYFS		Science in the Early Years at KPNS is covered in 'Understanding the World' It is introduced through both direct teaching and indirectly through continuous provision. An enabling environment offers opportunities for the children to explore, ask questions, solve problems, observe, predict, think critically, make decisions and talk about the world around them. Adults facilitate progression in learning by planning appropriate activities and timely interactions (e.g., I wonder what would happen if….' Asking enquiring questions, working alongside children to explore and investigate together, modelling skills and scientific language.					
Year One:		Seasonal Changes (ongoing topic) Observe changes across the four seasons. Observe and describe the weather associated with the seasons and how day length varies. Green plants Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. Identify and describe the basic structure of a variety of common flowering plants, including trees.	Seasonal Changes (ongoing topic) Observe changes across the four seasons. Observe and describe the weather associated with the seasons and how day length varies. Materials Distinguish between an object and the material from which it is made Identify and name a variety of everyday materials including wood, plastic, glass, metal, water, and rock. Describe the simple physical properties of a variety of everyday materials Compare and group together a variety of everyday materials based on their physical properties. Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	Animals incl. humans ; chicks. Identify and name a variety of common animals. Identify and name variety of common animals that are carnivores, herbivores and omnivores. Describe and compare the structure of a variety of common animals. Animals incl. humans; sense Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	Animals incl. humans ; chicks. Identify and name a variety of common animals. Identify and name variety of common animals that are carnivores, herbivores and omnivores. Describe and compare the structure of a variety of common animals. Animals incl. humans; sense Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	Seasonal Changes (ongoing topic) Observe changes across the four seasons. Observe and describe the weather associated with the seasons and how day length varies.	Seasonal Changes (ongoing topic) Observe changes across the four seasons. Observe and describe the weather associated with the seasons and how day length varies. Light and Dark Observe and name a variety of sources of light, including electric lights, flames and the Sun Associate shadows with a light source being blocked by something.
Year Two		Green plants Observe and describe how seeds ad bulbs grow into mature plants. Find out about and describe how plants need water, light and a suitable temperature to grow and stay healthy.	Animals incl. humans ; Notice that animals, including humans have offspring which grow into adults. Find out about an describe the basic needs of animals including humans, for survival (air, water, food) Describe the importance for humans of exercise, eating the	Materials Identify and compare the uses of everyday materials and particular uses. Compare how things move on different surfaces.		Living things and their habitats; Explore and compare the difference between things that are living, dead and things that have never been alive. Identify that most things live in habitats to which they are suited and describe how these habitats provide the provide the basic needs, and depend on each other. Identify and name a variety of plants and animals in their habitats, including micro-habitats.	

			right amounts of food, and hygiene,			Describe how animals obtain their food from plants and animals; use food chains and identify food sources.
Year Three		Animals, including humans Identify that animals, including humans need the right types of nutrition, and that they cannot make their own food; they get nutrition from what they eat. Identify that humans and some animals have skeletons and muscles for support, protection and movement. (human focus) Animals, inc humans Identify that animals, including humans need the right types of nutrition, and that they cannot make their own food; they get nutrition from what they eat. Identify that humans Identify that humans and some animals have skeletons and muscles for support, protection and movement. (animal focus)	Rocks Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties Recognise that soils are made from rocks and organic matter. Rocks Describe in simple terms how fossils are formed when things that have lived are trapped within rock	Light and Dark Recognise that they need light in order to see things and that dark is the absence of light. Notice that light is reflected form different surfaces. Light and Dark Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. Recognise that shadows are formed when light from a light source is blocked by a solid object. Find patterns in the way that the size of shadows change. Notice that light is reflected from surfaces	Forces & Magnets Notice that some forces need contact between two objects, but magnetic forces can act at a distance. Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials Observe how magnets attract or repel each other and attract some materials and not others. Describe magnets as having two poles. Predict whether two magnets will attract or repel each other.	Plants Identify and describe the functions of different parts of flowering plants. Plants Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant. Investigate the way in which water is transported within plants Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.
Year Four		Living things and their habitats Recognise that living things can be grouped in a variety of ways. Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. Recognise that environments change and that this can sometimes	**Sound** Identify how sounds are made, associating some of them with something vibrating. Find the pattern between pitch of sound and features of the object that produced it. Find patterns between the volume of sound and the strength of the vibrations that produced it.	Electricity Identify common appliances that run on electricity. Construct a simple series circuit, Identifying its basic parts (cells, wires, bulbs, switches, buzzers). Identify whether or not a lamp will light in a simple series circuit. Recognise that a switch opens and closes a circuit and associate this with whether or	Animals, incl humans Describe the simple function of the basic parts of the digestive system in humans Identify the different types of teeth in humans and their simple functions Animals, incl. humans Construct and interpret a variety of food chains, identifying producers, predators and prey.	States of matter Compare and group materials together, according to whether they are solids, liquids or gases. Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius . Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

		pose dangers to living things.		not a lamp lights in a simple series circuit. Recognise some common conductors and insulators, and associate metals with being good conductors.			
Year Five		Properties of changes of Materials Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. Demonstrate that dissolving, mixing and changes of state are reversible changes..	Living things and their habitats Explain the differences in the life cycles of a mammal, an amphibian, an insect and a bird. Describe the life process of reproductions in some plants and animals.	Earth & The Solar System Describe the movement of the Earth and other planets relative to the sun in the solar system. Describe the movement of the moon relative to the Earth. Describe the sun, Earth and moon as approximately spherical bodies. Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. Forces - Gravity Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.	Change in Material Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.	Animals, incl humans Describe the changes as humans develop into old age.	
Year Six		Electricity Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. Use recognised symbols when representing a simple circuit in a diagram.	Light Recognise that light appears to travel in straight lines. Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.	Living things and their habitats; classification Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals. Give reasons for classifying plants and animals based on specific characteristics.		Animals, incl. humans Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. Describe the ways in which nutrients and water are transported within animals, including humans.	Inheritance and evolution Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.

						Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

Knowledge Organiser Guidance (use A4 format)

Knowledge organisers are a summary of the key facts, the powerful essential knowledge that pupils need to access a unit of work or a curriculum subject.
They should be no more than one side of A4 with all the information broken down into easily digestible chunks, in this was they become an effective resource to support teaching.

The knowledge included should be concise and should come back to the big idea and cover all enquiry questions from the unit of work.

- Colour: green
- 'Big Idea' and subject at the top
- Vocabulary: in a table on the left with alternating colour rows (child friendly definitions)
- No more than 7-9 labels on diagrams. Events on a timeline or locations on a map.
- Use labelled visuals ONLY where it shares knowledge as duel coding (not for design or decoration)
- Use the same diagrams on your knowledge organiser as you do in the lessons or on your teaching slides.
- TABLES predominantly used to show concise sticky knowledge for the unit-they should be quizzable.
- There is no limit on the boxes used but ensure they are in line and uniform.

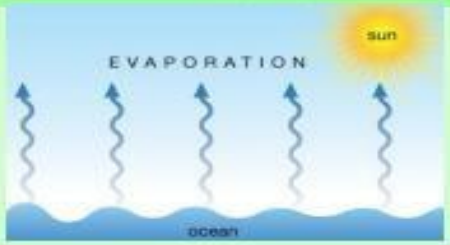
REMEMBER: Knowledge organisers are NOT a curriculum, they only summarise the most powerful, important knowledge that will be revisited again and again throughout a unit and beyond.

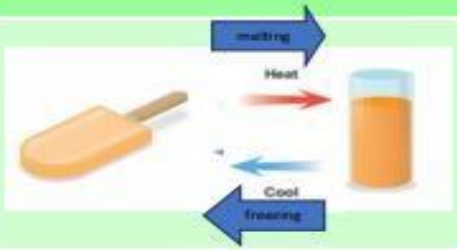
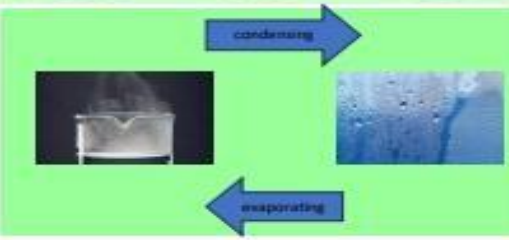
WAGOLL

Changes of materials

Vocabulary	Definition
dissolve	A solid that completely mixes in a liquid.
soluble	Solids that dissolve in liquids, so that you can no longer see any bits.
solution	A mixture of a liquid with a dissolved solid.
insoluble	Solids that do not dissolve in liquid.
filter	Separates an insoluble solid that is mixed in a liquid.
evaporation	Separates a soluble solid and a liquid.
reversible change	Changes that are not permanent and can be switched back, eg dissolving, melting, freezing.
non-reversible change	Changes that cannot be reversed back to their original state. E.g. burning, rusting.

Non-reversible changes	These result in the formation of new materials
Burning	
Rusting	
Mixing vinegar and bicarbonate of soda	

Separating materials	Reversing the process to get back the original materials.
Filtering separates insoluble solids from liquids.	
Evaporating separates soluble solids from liquids.	

Reversible changes	These changes are not permanent.
Dissolving sugar in water to make a solution.	
	

KPNS Science Planning Template

KPNS Science Unit Planning

Year Group: Term: _____ Topic:

Big Ideas:

Enquiry question and BGs	Retrieval Activity	Teacher Input (direct teaching)	Activities (modelling and scaffolding)	Key Vocab	Evidence in books and resources	Working Scientifically focus

I

KS1 investigation planning document and KS1 investigation results document.

Date

Our enquiry question...

Eg. Which materials are the most absorbent?
(teacher add this here)

What do I already know about this? 	
What we are going to change... 	
What we are going to measure... 	
What I think is going to happen... 	

Date

Enquiry question:

Here is a picture of us completing our experiment!

Teacher to add:

Open ended activity that relates to the aim of the experiment

Eg. Sorting activity, labelled diagram, simple results table, pictogram etc.

Eg.

Name	Foot length (cubes)
Jane	8 cubes
Bill	12 cubes

LKS2 investigation planning document and LKS2 investigation results document.

Children work in groups to plan different potential investigations, but all complete the same investigation and method.
Results tables pre-populated with headings by teacher.

Date

We are investigating.....

The **variables** we could change	The **variables** we could **measure/observe**
We **will** change	We **will** measure/observe

Our **question** is...

If we change ☐ what will happen to ☐ ?

To make it a **fair test** we will keep these **variables** the same	Our **predictions** are...

Date

Our enquiry question: _____

What we did in our investigation:

First, we...	Then we...
Next we...	Finally we...

Our results table:

Independent variable (teacher to add here)	Dependent variable (teacher to add here incl unit of measurement)

Conclusion

Our investigation has shown us that _____

I think this has happened because...	In the future I could investigate...

UKS2 investigation planning document.

Date

Today we are investigating (topic)

_____

If we change... (independent variable)	We will measure... (dependent variable)

The variables I have chosen for my investigation are:

Independent: _____

Dependent: _____

My enquiry question is _____

_____

_____

What variables are we keeping the same?

What we are going to do	What we are going to need

My prediction (What do you think will happen?)

_____

_____

_____

_____

I think this will happen because... (what have you learnt that makes you think this?)

_____

_____

_____

_____

_____

_____

UKS2 investigation results document.

Date

Our enquiry question: _____

What we did in our investigation:

Our results table:

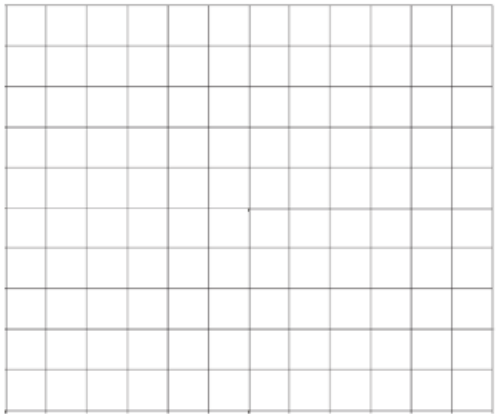
Conclusion

Our investigation has shown us that _____

This has happened because

If I were to complete this experiment again in the future, I would change...

Based on your results what else could you investigate in the future?



A graph showing _____

Here is a picture of us completing our experiment!

SEND Provision in Science.
Possible Adaptations

Cognition and Learning Needs

- Provide word banks that are accessible throughout the science topic. Encourage learners to tick the words they feel confident with to help target language that still needs support, e.g., when learners can independently use a word in a sentence.
- Begin each lesson with a review of the vocabulary learnt in the previous lesson. Retrieval tasks.
- Refer to language regularly during lessons and, where applicable, throughout the school day, as this will embed the vocabulary and build stronger links and associations.
- Learning walls / displays
- Plan small group teaching opportunities, for example whilst learners who have already met an objective are doing enrichment activities independently, dedicate time to and provide additional learning opportunities for learners working towards the learning objective.
- Provide learners with examples to use as a model whilst completing independent work.
- Using real-life experiences. Bring abstract concepts to life through concrete resources and comparisons.
- Provide pre-teaching opportunities for learners to hear vocabulary prior to the lesson, to support their access and engagement in whole-class teaching. Provide post teaching experiences to clarify information.
- Topical word banks and picture cards that the learner can point or refer to when explaining scientific processes.
- Collate word/picture banks on a mini whiteboard/paper with the learner during the teaching input to support their independent learning activity.
- Scaffold learning to make it accessible for all, e.g., if writing up the method for their experiment, a learner with writing difficulties could verbally explain for you or a teaching assistant to scribe, note-take, draw an explanation or make a video clip explaining their answers/ take photographs and annotate / record on a Dictaphone or when creating data tables for an experiment, learners with numeracy difficulties could create a pictogram instead etc.
- Provide sentence starters / use reading pens / question prompts / cue cards for maths operations or math learning mats / close procedures / talking photos / talking partners / pairing and matching activities.
- Employ manipulatives and resources used in familiar contexts e.g. maths lessons to support learning in science. ICT resources such as Clicker.
- Model: ‘think aloud’ when demonstrating.

Communication and Interaction Needs

- Environmental adaptations – optimise listening conditions / seating positions / reduce sensory distractions.
- Use of visual aids / timetables / working walls.
- Use of movement, calming and/or sensory breaks.
- Peer working / talk partners / use shared roles or designated roles in group work with cue cards.
- Link to child’s personal interests if possible.
- Use of real-life objects and kinesthetic means of teaching to maintain attention and support understanding.
- Language – non-demanding / positive instruction / reduced / avoid abstract words or concepts, figurative language / choices / provide accurate language models.
- Allow additional processing time. Repeating. Rephrasing. Recapping.
- Visuals for asking for help. Teach asking for help.
- Prepare for transitions and change.
- Adapt classroom and activities according to individual sensory profile e.g. allow ear defenders or gloves to be worn etc for messy work / quieter work area etc.

SEMH Needs

- Pre-expose learners to the equipment and nature of the lesson to spark engagement and interest in the upcoming lesson.
- Plan and use movement breaks and sensory breaks into the lesson.
- Create a working classroom environment that is calming and simple, e.g., clear routines, organised workspaces and minimise distractions, alternative seating, all resources out and available etc. Have safe space/calming space available. Calming box.
- Use learning checklists and timers. Chunking instructions. Checking understanding.
- Behaviour - apply specific praise for some individuals.
- Engineer success by using the pupil's strengths.
- Interactive strategies to maintain involvement e.g. whiteboards to all hold up answers / come to the front and take a role etc.
- Provide scaffolding / visuals to maintain focus. Model what you want to see.
- Personalise to a child's interests, if possible.
- Language - consider appropriate language choice: non-demanding / language promoting choice / reducing anxiety etc. Keep instructions, routines and rules short, precise and positive. Consider a child's background and adapt accordingly.
- Prepare for transition and change.
- Adapt classroom and activities according to individual sensory profile e.g. allow ear defenders or gloves to be worn etc for messy work / quieter work area etc.

Physical and Sensory Needs

- Adaptions for visually impaired: altered seating / altered background choices / text size / additional support through recorded instructions, verbal commentary / limit periods of visual strain / eliminate unnecessary copying from the board / pre and post teaching / use of equipment recommended by SFSS.
- Adaptions for hearing impaired: adapt seating, your position to face the child / keep background noise to a minimum / use signing to support / check understanding frequently / provide additional visual resources of spoken words / use additional visuals with new vocabulary / limit periods of auditory strain / pre and post teaching / use of equipment recommended by SFSS.
- Physical needs: Use specific equipment provided and suggested by PDSS / consider classroom organisation to allow for child to have free movement where possible / bring activities to them / encourage more oral recording if appropriate / eliminate unnecessary copying or recording / consider tiredness and adapt activities accordingly with scaffolding.
- Allow additional processing time / working time.
- Allow access to additional ICT equipment, where appropriate.
- Make bespoke adaptations for Sensory Needs – e.g. working outside a classroom if required / allowed to wear gloves for messy work / ear defenders each bespoke to the child's sensory profile.

NOTE: Where a pupil has additional funding and a 1:1 TA, follow the child's Individual SEND Support Plan for adaptations and provision details.