Opening Doors, Enriching Lives

Science at Tanfield Lea Community Primary School

'We look at science as something very elite, which only a few people can learn. That's just not true. You just have to start early and give kids a foundation. Kids live up, or down, to expectations.' - Mae Jemison (the first African American woman in space)

Pre-School		
Topic	**Key Vocabulary**	**Key Knowledge/ Skills**
Ongoing throughout the year: -Observation of **Seasonal Changes** as they occur -Exploration of **scientific equipment** within continuous provision **Autumn:** **Animals including humans:** Parts of my body **Spring:** **-Animals including humans** : Who am I? (meeting a real baby and different aged people from the community) **-Everyday materials:** exploring everyday materials **Summer:** **Animals including humans: /** Living things (linked to the farm trip) **Plants:** How living things grow	Words related to **Seasonal Changes** (puddles, weather words hot, cold, sunny, windy, snowy, rainy, icy freezing, frosty, Autumn, Winter, Spring, Summer) -Words related to **animals including humans** (head, shoulders, knees, toes, eyes, ears, mouth, nose, arms, legs, neck, elbow, back, waist, tongue, person, ourselves, baby, young, old, pet's children have and animals we see on farm visit (dog, cat, fish, cow, calf, duck. Duckling etc) Words related to **everyday materials** to describe objects: that will be incorporated into provision depending on children's interests to describe objects (light / dark, heavy / light, float / sink, freeze, melt, materials).- Words related to **plants** (tree, leaf, grass, flower), seed, stem , petal grow, root) -Words for scientific **equipment** (funnel, beaker, magnifying glass, jug, pipette) These will be incorporated into continuous provision for children to use and explore	**Understanding the World: The Natural World** **Seasons:** What happens in different seasons throughout the year in the Natural World? What do we expect the weather to be like? Enquiry type: Observing changes over time **Animals including humans:** Where are my body parts? Let's find out about people of different ages Enquiry type: Observing changes over time Let's talk about our pets! Let's talk about farm animals and their babies! Enquiry type: Grouping and classifying, which baby belongs to which animal? **Everyday materials:** Enquiry type: Grouping and classifying Exploring light and dark Exploring floating and sinking Exploring freezing and melting **Plants:** Enquiry type: Observing changes over time What happens when you plant a seed? Where are parts of a plant? For all above: Enquiry type: I ask simple scientific questions? I use books and other secondary sources to find out more **Use of equipment / exploring scientific concepts:** I know the purpose of different equipment and begin to use them scientifically

Reception

Topic	Key Vocabulary	Key Knowledge/ Skills
Ongoing throughout the year: -Observation of weather and seasons -Exploration of **scientific equipment** within continuous provision Autumn: My body **Animals including humans: More** parts of my body w/s focus: Introduction to **planning** and **doing** following children's interests -How do plants change over time (begin observational drawing of a deciduous tree, update throughout the year) Spring: -Who am I? Meeting the baby from the school community who will now be a toddler (visited last year in Pre-School). How have they changed? w/s focus: Introduction to **reviewing** following children's interests Summer: -Living things -How things grow -How do plants and animals change over time? w/s focus: Introduction to planning following children's interests -Science investigation/activities (following children's interests from Great Northern Museum trip-dinosaurs, animals, Egyptians etc.).	Develop above vocabulary and introduce -Words we use when **working scientifically (**question, answer, observe, diagram / photograph, equipment, experiment, describe, plan, do, review, science, scientist) -Words for **everyday materials** that will be incorporated into provision depending on children's interests to describe objects (magnetic / non-magnetic, electric/ natural / manmade) -Words related to **body parts** (heart, lungs, chest, waist, nostril, eyebrow, teeth) -Words related to **plants (**fruit, vegetable, environment) -Words related to **animals' (**egg, caterpillar, pupa, butterfly spawn tadpole frog, toddler) -Words related to **change over time** (fossil, dinosaur, decay, similarity / difference) -Words for **scientific equipment** incorporated into provision (cylinder, thermometer, magnet, a wide range of natural materials)	**Understanding the world: The Natural World** **Seasons:** What happens in different seasons throughout the year in the Natural World? What do we expect the weather to be like ? Understand some important processes and changes in the natural world around them, including the seasons Enquiry type: Observing changes over time **Animals including humans:** Where are my body parts? Let's find out about how a baby changes , drawing pictures to record changes Enquiry type: Observing changes over time **Everyday materials:** Exploring magnetism Enquiry type: Grouping and classifying Exploring electricial / non electrical Enquiry type: Grouping and classifying Exploring natural ./manmade Enquiry type: Grouping and classifying **Plants:** Enquiry type: Observing changes over time How does a tree change over a year? Making observations and drawing pictures of plants Exploring similarities and differences between the natural world around them and contrasting environments **Use of equipment / exploring scientific concepts:** I know the purpose of different equipment and begin to use them scientifically For all above: Enquiry type: I ask simple scientific questions? I use books and other secondary sources to find out more, drawing on own experiences and what has been read in class

Year 1 and 2 Cycle A

Topic	Key Vocabulary	Key Knowledge/ Skills (Bold indicates Working Scientifically objectives)
Autumn 1 **Animals including humans** **WS Focus - Doing**	healthy, unhealthy, muscles, diet, nutrition, exercise, protein, carbohydrates, fats, dairy, vitamins, skeleton, heart rate, pulse, observe, grouping, classifying	Know that it is important for humans to exercise, eat the right amount of different types of food, and use good hygiene. **Gather and record data to help in answering questions – e.g.** how many times can I do different activities in a minute and how do I feel afterwards? Which exercises were the hardest to do? E.g. **Gathering information** about how to look after a pet and **recording** as a poster. **Enquiry Types** – Observing Over Time (How much food and drink do I have in a week?) Grouping and Classifying (Which offspring belongs to which animal?) Fair Tests (Do you get faster as you get older?)
Autumn 2 **Seasonal Changes** **WS Focus - Doing**	Autumn, leaves, change, hedgehog, hibernates, hibernation, weather, diary, report, temperature, thermometer, symbol, clothes, seasons, weather, winter, leaves, change, migrate, migration,	**Make observations** about changes across the seasons (autumn walk) Describe the weather in different seasons – e.g. **collect rainfall in a measuring cylinder** (**using simple equipment**) **Enquiry Types** – Observing changes over time (Season and weather diary), Research using secondary sources - look through different seasonal books.
Spring 1 **Plants** **WS Focus - Reviewing**	Plant, bean, grow, diary, observe, predict, experiment, conditions, seeds, stem, root, leaves, flower, function, part, petal.	Identify a variety of plants, including trees, and describe their basic structure. Begin to **ask simple questions** about plants. **Enquiry Types** – Pattern seeking (Where do daisies grow best in our school grounds?), Grouping and Classifying (Grouping evergreen and deciduous trees), Fair/Comparative test (Which conditions do mustard seeds grow best?)
Spring 2 **Plants** **WS Focus - Reviewing**	Roots, leaves, stem, petal, flower, bud, seed, seedling, observe, grow, measure, height,, water, light, temperature	Describe how seeds and bulbs grow into mature plants **Perform simple tests** to find out what plants need to grow and stay healthy (water, light, a suitable temperature) **Ask simple questions** relating to plants, their needs and growth **Enquiry Types** – Notice Patterns (Do bigger seeds grow into bigger plants?), Grouping and Classifying (How can we identify the trees that we observed on our tree hunt?) Fair/ Comparative Test (Do cress seeds grow quicker inside or outside?)
Summer 1 **Seasonal Changes** **WS Focus - Planning**	Seasons, autumn, spring, summer, winter, weather, changes, observe, diary, similarities, differences	**Observe changes** across the seasons and use their observations to **suggest answers to questions** – e.g. look at two photos of a tree in different seasons and answer what they think happened Describe the weather in different seasons – e.g. collect rainfall to compare with earlier in the year **Enquiry Types** – Observing changes over time (Season and weather diary)
Summer 2 **Animals, Including Humans** **WS Focus - Planning**	Animal names and baby names, classification, fish, reptile, mammal, amphibian, bird, features, purposes, differences, body parts, carnivores, omnivores, herbivores, minibeast, tally, tally chart, Vertebrate Invertebrate	Identify a variety of animals and name some that are carnivores, herbivores and omnivores. Describe and compare the structure of different animals. Begin to **ask simple questions** about plants. **Enquiry Types**– Grouping and Classifying (How can we organise the animals in the zoo?),

Year 1 and 2 Cycle B

Topic	Key Vocabulary	Key Knowledge/ Skills (Bold indicates Working Scientifically objectives)
Autumn 1 **Animals, including humans** **WS Focus - Doing**	Senses, body parts, sight, see, look, eyes, smell, nose, touch, skin, sound, listen, hear, taste, tongue, bones, skull, ribs	Identify basic human body parts and senses, and **make observations** using their different senses **Enquiry Types** – Comparative – can you taste foods without using your nose? Grouping and Classifying (Identifying using the senses)
Autumn 2 **Animals including humans** **WS Focus - Doing**	Offspring, babies, toddlers, child, teenager, adult, elderly, parent, chronological, healthy, unhealthy, muscles, diet, nutrition, exercise, protein, carbohydrates, fats, dairy, vitamins, skeleton, heart rate, pulse, observe, grouping, classifying	Know that animals (including humans) have offspring that grows into adults, and know what they need for survival. Know that it is important for humans to exercise, eat the right amount of different types of food, and use good hygiene. **Gather and record data to help in answering questions – e.g.** how many times can I do different activities in a minute and how do I feel afterwards? Which exercises were the hardest to do? E.g. **Gathering information** about how to look after a pet and **recording** as a poster. **Enquiry Types** – Observing Over Time (How much food and drink do I have in a week?) Grouping and Classifying (Which offspring belongs to which animal?) Fair Tests (Do you get faster as you get older?)
Spring 1 **Everyday Materials** **WS Focus - Reviewing**	Material, natural, man-made, magnetic, non-magnetic, object, property, hard, smooth, shiny, soft, waterproof, transparent, opaque, fair test, Venn diagram, sort	**Identify** a variety of everyday materials, know their simple physical properties and compare/**classify** materials based on these. **Enquiry Types** – Grouping and Classifying (Magnetic, non-magnetic, waterproof, absorbent), Fair/Comparative Test (What is the best material for Teddy's umbrella), Research using secondary sources (What materials can be recycled?)
Spring 2 **Materials** **WS Focus - Reviewing**	Grouping, classifying, comparison, properties, transparent, flexible, rigid, strong, absorbent, waterproof, suitability	Building on their **observations** from Y1 on properties of materials, compare the suitability of different materials for different uses - **use their ideas to suggest answers to questions** (e.g. Which materials would a pirate need to use on their ship and why?). Find out how the shapes of solid objects can be changed. **Enquiry Types** – Observing Over Times (Would a paper boat float forever?) Grouping and Classifying (Which Materials are shiny and which are dull?) Fair test (Which materials are the most flexible?)
Summer 1 and 2 **Living Things and Their Habitats** **WS Focus - Reviewing**	Habitat, suited, compare, explore, living, dead, micro-habitats, food chains, sources of food, producer, predator, research, grouping, classifying	Compare the differences between living things, things that are dead and things that have never been alive Explore the habitats of different animals and how they provide for the needs of living things, **identify and classify** animals in their habitats Explore simple food chains and name different sources of food. **Enquiry Types** – Grouping and Classifying (How can we identify the animals in their habitat? Research using secondary sources (How does the habitat on the coast to land compare?)

Years 3 and 4 Cycle A

Topic	Key Vocabulary	Key Knowledge/ Skills (Bold indicates Working Scientifically objectives)
Autumn 1 **Animals Including Humans (Y3 objectives)** **WS Focus - Doing**	Nutrition, vitamin, mineral, fat, protein, carbohydrate, fibre, water skeleton – support and protection, movement, skull, ribs, joints, muscles – movement, pull, contract, relax, diet, vertebrate, invertebrate Record, table, accurate	Know that animals (including humans) need the right types of nutrition and explore why we have skeletons and muscles **Gather and record data using labelled diagrams and tables** **Present findings** from research about the human skeleton **Enquiry Types** – Observing Over Time (Measuring Height Over The Year), Notice Patterns (Do Shoe Sizes Get Bigger As Children Get Taller?), Grouping and Classifying (Comparing the skeletons of different animals), Research Using Secondary Sources (Researching and drawing the skeleton)
Autumn 2 **Forces and Magnets** **WS Focus - Doing**	Force, push, full, open, surface, magnet, magnetic, attract, repel, magnetic poles, North, South, compare Labelled diagram, observe	Compare how things move on different surfaces and **take measurements of length** **Gather, record and classify** magnetic materials, know that magnets can act at a distance and find out about magnets having two poles **Record findings using drawings and bar charts** (do this with magnet and paper clip exp) **Enquiry Types** – Notice Patterns (Does the size of a magnet affect how many paper clips it can pick up?), Grouping and Classifying (Magnetic and non-magnetic materials), Comparative test (Vehicles on different surfaces)
Spring 1 and 2 **Plants** **WS Focus - Reviewing**	**Common, wild plants, garden plants, deciduous, evergreen** (covered in Y1 but need to come back to) Trunk, branches, leaf, root Leaf, **root**, **leaves**, bud, **flowers**, blossom, **petals**, root, **stem** (covered in Y2 but need to come back to) Fruit, vegetables, bulb, seed Pollination, seed formation, seed dispersal, germination, transport Conclusion, evidence, prediction	Know the functions of roots, stem, leaves and flowers and **report on** how the requirements of plants for life and growth can vary (e.g. researching cactuses, snowdrops, seaweed) Investigate how water is transported in plants and **use evidence to support their findings (develop skills in written explanations), then raise further questions for investigation** **Draw simple conclusions** about the requirements of plants for soil Find out about flowers in the life cycle of plants : pollination, seed formation and seed dispersal **Enquiry Types** - Observing Changes Over Time (dye through plants) Fair Testing (conditions for germination)
Summer 1 **Light** **WS Focus - Planning**	Dark (knowing that dark is the absence of light, not a colour in itself), reflect, **surface**, natural, shadow, translucent, opaque, transparent, blocked, artificial, Research, enquiry, fair test	Know that we need light to see things and **set up a simple practical enquiry** to find out which surfaces reflect light the best Investigate how shadows are formed and find patterns in the way the size of shadows change by **setting up a simple practical enquiry** Find out about the dangers of light from the sun **Enquiry Types** – Observing Changes Over Time (When is our classroom darkest?), Grouping and Classifying (Natural and man-made light sources), Comparative Test (How many layers of transparent materials are needed to block light?), Research & Secondary Sources (Sun protection)
Summer 2 **Rocks and Soils** **WS Focus - Planning**	Appearance, physical, properties, **hard/ soft, shiny/dull, rough/smooth, absorbent/not absorbent,** porous, fossils, sedimentary, igneous	**Ask relevant questions** and investigate the appearance and simple physical properties of rocks Find out, in simple terms, how fossils are formed Know that soils are made from rocks and organic matter Note – one-off lesson during this topic to develop skills in **comparative testing** **Enquiry Types** – Grouping and Classifying (Sorting rock types), Research (Mary Anning)

Years 3 and 4 Cycle B

Topic	Key Vocabulary	Key Knowledge/ Skills (Bold indicates Working Scientifically objectives)
Autumn 1 **Living Things and their Habitats** **WS Focus - Doing**	Environment, flowering, non-flowering, **fish, amphibian, reptile, bird, mammal**, insect, classify, classification key, local, human impact **Record, accurate**	Know that living things can be groups in a variety of ways and explore **classification keys** Know that changing environments can be dangerous to living things and **present research** related to this **Enquiry Types** - Grouping and Classifying (classification keys)
Autumn 2 **States of Matter** **WS Focus - Doing**	Solid, solidify, melt, freeze, evaporate, condense, liquid, gas, container, changing state, states of matter, heating, cooling, degrees celcius, themometer, water cycle, melting, temperature, water vapour **Record, table, accurate**	**Classify** solids, liquids and gases Explore how some materials change state when they are heated or cooled; **take accurate measurements** using a thermometer and **record findings using simple scientific language** Find out about evaporation and condensation in the water cycle and **gather and record data** related to temperature and the rate of evaporation **Enquiry Types** - Grouping and Classifying (Which materials are solids, liquids and gasses?) Observing changes (What happens when we heat chocolate? What happens when we cool objects below 0 degrees Celsius? Evaporation amd condensation)
Spring 1 and 2 **Animals Including Humans (Y4 objectives)** **WS Focus - Reviewing**	Digestion, parts of system – mouth, saliva, oesophagus, stomach, enzymes, small intestine, large intestine, colon Teeth – incisor, canine, molars, floss, brush Food chain – **producers, prey, predators, carnivore, herbivore, omnivore** (revisit from Y2)	Find out about the parts of the digestive system and their functions – present findings using a model / **display** Identify the different types of teeth in humans and their functions – investigate toothpaste and **use results to draw simple conclusions and raise further questions** Identify **differences, similarities and changes related to simple scientific ideas and processes** – can we link to teeth and hygiene in History here and pre-order a dentistry loan box from BDA. **Use straightforward scientific evidence to answer question** (What do an animal's teeth tell us about them?) **Enquiry Types** - Observing Changes (What happens to eggs when they are left in different liquids?)
Summer 1 **Electricity** **WS Focus - Planning**	Appliance, electricity, electrical circuit, cell, wire, bulb, buzzer, insulator, conductor, switch	Identify common appliances that run on electricity **Set up a simple practical enquiry** to investigate conductors and insulators Construct a simple series circuit and know that the circuit needs to make a complete loop **Enquiry Types** – Grouping and Classifying (Grouping devices based on where the electricity comes from), Comparative Test (How does the thickness of a conducting material affect how bright the bulb is?)
Summer 2 **Sound** **WS Focus - Planning**	Vibrate/tion/ting, medium, volume, pitch, faint, string, percussion, woodwind, brass, insulate	Know that sounds are made from vibrations and these travel to the ear **Set up simple practical enquiries** to find patterns in the pitch and volume of a sound Notice that sounds get fainted as the distance from its source increases Note – one-off lesson during this topic to develop skills in **comparative testing** **Enquiry Types** - Pattern-seeking (When and where do we notice patterns?), Comparative and Fair Testing (Which material is best for muffling sounds?)

Years 5 and 6 Cycle A

Topic	Key Vocabulary	Key Knowledge/ Skills (Bold indicates Working Scientifically objectives)
Autumn 1 **Electricity** **WS Focus - Doing**	Voltage, switches, circuit diagram Revisit: Appliance, electricity, electrical circuit, cell, wire, bulb, buzzer, insulator, conductor, switch, light meter **Variables, Repeat reading, precision, fair test** Subject: Physics	Investigate reasons for variation in the brightness of a lamp/loudness of buzzer and record results using **tables, scientific diagrams and labels** and **use the results of their tests to make predictions and set up further fair tests** **Take measurements** and **repeat readings** using light meters and sound meters (on iPads) Use recognised symbols in a circuit diagram **Enquiry Types** – Comparative Test (Does ____ affect the brightness of a bulb / volume of a buzzer?), Research and Secondary Sources (Franklin and Faraday)
Autumn 1 and Spring 1 **Living things, reproduction and life cycles (1 term)** **WS Focus – Doing and Reviewing**	Mammal, amphibian, insect, reproduction, asexual, sexual, micro-organisms, classifying, characteristics, foetus, adolescence, fertilisation, gestation, embryo. Subject: Biology	Compare the life cycles of mammals, amphibians, insects and birds Describe reproduction in some animals and plants and know how humans change as they develop to old age Explore how living things (including micro-organisms, plants and animals) are **classified** into broad groups and give reasons for **classifying**, linking with **classification keys** **Record and present data using bar and line graphs** relating to the life cycles of animals (e.g. looking for patterns in the life span of animals) **Present findings** from research into life cycles and living things **Enquiry Types** – Observe changes over time (How do we change as we grow?)
Spring 2 **Evolution** **WS Focus - Reviewing**	Adaptation, evolution, inherited/ance, adaptive traits, natural selection, DNA, genes, variation, offspring, habitat, fossilisation, mutations Subject: Biology	Know that living things have changed over time and fossils prove information about living things Know that offspring vary and are not identical to parents Know how animals and plants are adapted to suit their environment and this may lead to evolution – **identify scientific evidence that has been used to support ideas** **Report findings from their research in this topic in an oral form** (presentation/ documentary film) **Enquiry Types** – Observing Changes Over Time (Black / white moth populations, Changing heights over time), Grouping and Classifying (Comparing Neanderthal skeletons to apes and humans), Research (What happened when Charles Darwin visited the Galapagos islands?)
Summer 1 **Light** **WS Focus - Planning**	Reflect, Reflection, Source, periscope, filters, transparent, translucent, opaque Subject: Physics	Know that light appears to travel in straight lines and use this to explain how objects are seen Use the idea that light travels in straight lines to explore shadows, **planning an enquiry into shadow shape**, and explain why shadows have the same shape as the objects that cast them Note – one-off lesson during this topic to develop skills in **planning different types of enquiry** **Enquiry Types** – Grouping and Classifying (Transluscent, opaque), Comparative Test (How does the distance of a light source affect the size of the shadow? And How does the angle that a light ray hits a plane mirror affect the angle at which it reflects off the surface?)
Summer 2 **Review KS2 objectives half-term** **WS Focus - Planning**	Vocabulary and objectives covered will depend on the units taught. Note – one-off lesson during this topic to develop skills in **planning different types of enquiry and controlling variables**	

Years 5 and 6 Cycle B

Topic	Key Vocabulary	Key Knowledge/ Skills (Bold indicates Working Scientifically objectives)
Autumn 1 **Properties and Changes of Materials** **WS Focus - Doing**	Solubility, transparency, thermal, conductor, conductivity, dissolve/ing, solution, separate, evaporate/ion, reversible, irreversible, filtering, sieving, rusting, magnetism, chemists, insulation, chemical Subject: Chemistry	**Record data** relating to everyday materials and their properties (hardness, solubility, transparency, conductivity, response to magnets) **using scientific diagrams, labels and tables.** Investigate solubility, **reviewing measuring skills,** and **use their results to make predictions and set up a further comparative test** Explore separation of materials and reversible / irreversible changes Enquiry Types: Observation changes (What happens to bread when we make toast?), Grouping and Classifying (What properties does a material have? Which materials dissolve?), Comparative/ Fair Testing (Which insulator is best?)
Autumn 2 **Forces** **WS Focus - Doing**	Gravity, air resistance, water resistance, friction, effect, accelerate, decelerate, break, mechanism, pulley, gear, spring, upthrust, Newton, newton meter, Subject: Physics	Explore the forces of gravity, air resistance, water resistance and friction – **take measurements using equipment** such as scales and force meters. Investigate levers, pulleys and gears **Record results from investigations using tables, bar and line graphs, and scatter graphs.** Enquiry Types: Comparative/Fair Testing (What makes a Gyrocopter fall faster?)
Spring 1 and 2 **Space** **WS Focus - Reviewing**	Solar system, rotate, orbit, axis, spherical, heliocentric, geocentric, tilt, hemisphere. Subject: Physics	Find out about the movement of the Earth, Moon and planets relative to the sun and **identify scientific evidence that has been used to support or refute ideas** Describe the Sun, Earth and Moon and approx spherical bodies Explain day and night and the apparent movement of the sun across the sky **Report findings from their research in this topic in a written form** (explanation text / fact file) Enquiry Types: Research, Comparative/ Fair Testing (What can influence the size of craters?)
Summer 1 **The Human Body (Animals Including Humans Y6 objectives)** **WS Focus - Planning**	Organs, heart, lungs, circulatory system, cardiovascular system, blood vessel, nutrients, veins, artery, chamber, ventricles, carbohydrate, protein, drugs Subject: Biology	Name parts of the human circulatory system and their functions **Plan an enquiry** relating to the impact of exercise on the way their bodies function, and know the effect of drugs and lifestyle on their bodies Explain **the degree of trust** in the results from their exercise enquiry Describe how nutrients and water are transported in animals including humans Enquiry Types: Comparative and Fair Testing (What can influence pulse/ breathing rate?)
Summer 2 **Review KS2 objectives half-term** **WS Focus - Planning**	Vocabulary and objectives covered will depend on the units taught. Note – one-off lesson during this topic to develop skills in **planning different types of enquiry and controlling variables**	