Nether Green Junior School

Science curriculum intent

At Nether Green, we aim to develop children's scientific knowledge, teach them scientific skills and engender their natural curiosity. We believe that the best way to learn science is through "hands-on" experience. Practical work is consolidated through discussion, written work and applying learning to new situations. Where possible, scientific learning is taught in the context of the class project and enables children to apply their scientific knowledge and skills for a purpose. Each year, the children are taught five science topics which can be split in to four broad areas. These are:

- **Scientific Enquiry / Investigative Skills**

- **Materials** (Children start to understand the properties of and differences between materials and their possible uses)

- **Physical Processes** (In this area, children focus on sound, forces and electricity)

- **Life Processes and Living Things** (Children learn about humans, animals, plants and the environment.)

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In Years 3 and 4, the children are encouraged to ask questions about scientific concepts and then carry out experiments to find out the answers. In doing this they learn what a 'fair test' is, take measurements from a range of equipment, gather and record data, report their findings orally and in writing.

In Years 5 and 6, children continue to practise the above skills, but with more depth and precision. When carrying out experiments, they learn:
-What variables are and how to control them.
-How to take measurements from a range of equipment whilst understanding the need for repeated measures to increase accuracy.
-They gather and record data using labels, classification keys, tables, scatter graphs, bar and line graphs.
-They use test results to make further predictions to set up further comparative and fair tests and make conclusions on the test carried out, orally and in writing.

- **In the half term where no science is linked to a class project, science will be taught independently.**
- **In each year group, the children will also be taught about the lives of famous scientists.**

Science long term plan

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	Earth Sciences		Chemistry	Biology	Physics	Stand-alone Investigations
Year Group	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer2
Y3	Rocks	Forces & Magnets	Light	Animals Including Humans	Plants	Jane Goodall (Explorify) Investigation 1 Water cycle in a tub Investigation 2 Which material is best for Teddy's raincoat?
Y4	Mya-Rose Craig (Explorify) Investigation 1 What happens when water is added to a plate of M and Ms? Investigation 2 How does cold water affect our bodies?	-Animals Including Humans	States of Matter Stephen Hawking	-Sound	Electricity Adam Hart (Explorify)	-Living Things & Their Habitats - Animals Including Humans
Y5	Maggie Adarin Pocock (Explorify) Investigation 1 Which shape of longboat holds the most weight?	Earth & Space	-Living Things & Their Habitats	- Animals Including Humans	Properties & Changes of Materials	Forces Katherine Johnson (Explorify)

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	Investigation 2 **Which coke will give the 'best' explosion? (Mento and coke investigation)**					
Y6	**Electricity**	**David Attenbrough (Explorify)** **Investigation 1** **Which ball is the bounciest?** **Investigation 2** **How does the size of the jar make a difference to how long a candle burns?**	**Living Things & Their Habitats** **Carl Linnaeus**	**Alexander Fleming (Explorify)** **Investigation 1** **How quickly does a jelly cube dissolve in water?** **Investigation 2** **Do children with the longest legs jump further?**	**Animals Including Humans** **Light**	**Evolution & Inheritance** **Charles Darwin**

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Year group	Prior Knowledge	New Knowledge	Vocabulary	Skills
Y3 Autumn 1	**How did life change between the Stone Age and the Iron Age?** (Rocks) Not taught in KS1	**Rocks** • compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • describe in simple terms how fossils are formed when things that have lived are trapped within rock • recognise that soils are made from rocks and organic matter.	**Rocks** fossils, soils, sedimentary, metamorphic, igneous, stone, texture, pebble, magma, hard/soft, formation, volcano, Earth sandstone, granite, marble, pumice, chalk, slate, sandy/clay/chalky soil, organic matter grains, crystals, absorbent, permeable, impermeable	**Working scientifically – Breakdown for Y3** **Planning:** -Can they use different ideas and suggest how to find something out? -Can they make and record a prediction before testing? -Can they plan a fair test to make comparisons? -Can they explain why they need to collect information to answer a question? **Obtaining and presenting evidence:** -Can they measure using different equipment and units of measure? -Can they record their observations in different ways? (labelled diagrams, charts etc) **Considering evidence and evaluating:** -Can they describe what they have found out using scientific words?

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Y3 Autumn 2	**<u>How do forces affect the world around us?</u>** (Forces & Magnets) Not taught in KS1	**<u>Forces and magnets</u>** • compare how things move on different surfaces • notice that some forces need contact between two objects, but magnetic forces can act at a distance • observe how magnets attract or repel each other and attract some materials and not others • compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials • describe magnets as having two poles • predict whether two magnets will attract or repel each other, depending on which poles are facing.	**<u>Forces And Magnets</u>** magnet, magnetic, force, contact, attract, repel, friction, poles, push, pull, surfaces, materials, strength,	
Y3 Spring 1	**<u>How does light behave?</u>** (Light) Not taught in KS1	**<u>Light</u>** • recognise that they need light in order to see things and that dark is the absence of light • notice that light is reflected from surfaces • recognise that light from the sun can be dangerous and that there are ways to protect their eyes • recognise that shadows are formed when the light from a light source is blocked by an opaque object • find patterns in the way that the size of shadows change.	**<u>Light</u>** light, shadows, mirror, reflect, reflective, dark/darkness, reflection, transparent, translucent, opaque, protect, light source, distance, solid, bright, Sun	

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Y3 Spring 2	**<u>What was life like for the Ancient Egyptians?</u>** (Animals including Humans) **Animals including humans – Y1** • identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals • identify and name a variety of common animals that are carnivores, herbivores and Omnivores describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) • identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. **Animals including humans –Y2** • notice that animals, including humans, have offspring which grow into adults • find out about and describe the basic needs of animals, including humans, for survival (water, food and air) • describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.	**<u>Animals, including humans</u>** • identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat • identify that humans and some other animals have skeletons and muscles for support, protection and movement.	**<u>Animals Including Humans</u>** animals, humans, movement, muscles, bones, spine, ribs, vertebrate, invertebrate skull, skeletons, protection, support, vital organs, nutrition, nutrients, healthy diet, balanced diet, food, fruit, vegetables, carbohydrates, protein, vitamins, minerals, dairy, fat, sugars	

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Y3 Summer 1	**<u>What do plants need to grow well?</u>** (Plants) **Plants –Y1** • 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. **Plants –Y2** • observe and describe how seeds and bulbs grow into mature plants. • find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.	**<u>Plants</u>** • identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers • explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant • investigate the way in which water is transported within plants • explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.	**<u>Plants</u>** plant, root, stem, trunk, leaf/leaves, air, light, dark, water, nutrients, nutrition soil, reproduction, dispersal, transportation, transport seed formation, pollination, seed dispersal, structure, function, flower, blossom, grow/growth, life cycle	
Y3 Summer 2	I**<u>nvestigation 1</u>** Water cycle in a tub **<u>Investigation 2</u>** **Which material is best for Teddy's raincoat?** **Famous scientist: Jane Goodall (see Explorify)**			
<u>Year group</u>	**Prior Knowledge**	**New Knowledge**	**Vocabulary**	**Skills**

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Y4 Autumn 1	**<u>Investigation 1</u>** **What happens when water is added to a plate of M and Ms?** **<u>Investigation 2</u>** **How does cold water affect our bodies?** **Mya-Rose Craig (Explorify)**			
Y4 Autumn 2	**<u>How do we make poo?</u>** Animals including Humans (Digestive system & teeth) **Animals including humans –Y3** • identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat • identify that humans and some other animals have skeletons and muscles for support, protection and movement.	**<u>Animals, including humans</u>** • describe the simple functions of the basic parts of the digestive system in humans • identify the different types of teeth in humans and their simple functions	**<u>Animals Including Humans</u>** digestive system, mouth, tongue, teeth, oesophagus, stomach, small intestine, large intestine, canine, incisor, molar	**<u>Working scientifically – Breakdown for Y4</u>** **<u>Planning:</u>** -Can they set up a simple fair test to make comparisons? -Can they plan a fair test knowing which single variable to keep the same and which variables to change? -Can they decide which information needs to be collected and decide which is the best way to collect it? -Can they make a prediction based on prior knowledge? **<u>Obtaining and presenting evidence:</u>** -Can they take measurements using different equipment and units of measure and record what they have found in a range of ways?

				-Can they make accurate measurements using standard units? -Can they record and present what they have found using scientific language, drawings, labelled diagrams, bar charts and tables? -Can they explain their findings in different ways (display, presentation, writing)? **Considering evidence and evaluating:** -Can they use their findings to draw a simple conclusion? -Can they find any patterns in their evidence measurements?
Y4 Spring 1	**States of Matter** Not taught before	**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 (°C) • identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	**States of Matter** evaporation/evaporate, condensation/condense, particles, temperature, degrees, freezing/freeze, heating, cooling, boiling point, materials, melt/melting, ice, water, steam, oxygen, precipitation, states of matter, water cycle, transpiration,	
Y4 Spring 2	**What are sounds made of? (Sound)** Not taught before	**Sound** • identify how sounds are made, associating some of them with something vibrating	**Sound** volume, vibration/ vibrate, wave, pitch,	

		• recognise that vibrations from sounds travel through a medium to the ear • find patterns between the pitch of a sound and features of the object that produced it • find patterns between the volume of a sound and the strength of the vibrations that produced it • recognise that sounds get fainter as the distance from the sound source increases. •	tone, noise, tune, sound source, distance, speaker, size, thickness, insulation, travel,	
Y4 Summer 1	**<u>Electricity</u>** **Not taught before**	**<u>Electricity</u>** •identify common appliances that run on electricity •construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers •identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery •recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit recognise some common conductors and insulators, and associate metals with being good conductors	**<u>Electricity</u>** electricity, cells, wires, bulbs, switches, buzzers, battery, mains, plug, metal, circuit, series, conductors, insulators, appliances, complete circuit, simple circuit, series circuit	

Y4 Summer 2	**<u>How does an ecosystem work?</u>** (Living Things and their Habitats) **Living things and their habitats –Y2** • explore and compare the differences between things that are living, dead, and things that have never been alive • identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other • identify and name a variety of plants and animals in their habitats, including microhabitats • describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. **Animals including Humans** (Food chains) **Animals including humans –Y1** • identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals • identify and name a variety of common animals that are carnivores, herbivores and Omnivores describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)	**<u>Living things and their habitats</u>** • recognise that living things can be grouped in a variety of ways • explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment • recognise that environments can change and that this can sometimes pose dangers to living things. **<u>Animals including humans</u>** •construct and interpret a variety of food chains, identifying producers, predators and prey.	**<u>Living Things and Their Habitats</u>** vertebrates, fish, amphibians, reptiles, birds, mammals, snails, slugs, worms, spiders, insects, plants, flowering/non-flowering environment, habitats, danger vertebrates/invertebrates, classification, key **<u>Animals Including Humans</u>** producer, predator, prey herbivore, carnivore, omnivore,	

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	Animals including humans –Y3 • identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat • identify that humans and some other animals have skeletons and muscles for support, protection and movement.			
Year group	**Prior Knowledge**	**New Knowledge**	**Vocabulary**	**Skills**
Y5 Autumn 1	**Investigation 1** **Which shape of longboat holds the most weight?** **Investigation 2** **Which coke will give the 'best' explosion? (Mento and coke investigation)** **Maggie Adarin Pocock (Explorify)**			

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Y5 Autumn 2	**<u>What is the solar system and how does it affect night and day around the world?</u>** **Earth & Space** Not taught before	**<u>Earth and space</u>** • 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.	**<u>Earth and Space</u>** Earth, Sun, Moon, planets – Mercury, Venus. Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Solar System, axis, rotate, rotation, orbit, position, tilt, Equator day, night, sky, phases of the moon, shadow, star,	**<u>Working scientifically – Breakdown for Y5</u>** **<u>Planning:</u>** -Can they plan and carry out an investigation by controlling variables fairly and accurately? -Can they make a prediction with reasons? **<u>Obtaining and presenting evidence:</u>** -Can they take measurements using a range of scientific equipment with increasing accuracy and precision? -Can they record more complex data and results using scientific diagrams, classification keys, tables, bar charts, line graphs. **<u>Considering evidence and evaluating:</u>** -Can they report findings from investigations through written explanations and conclusions? -Can they use a graph to answer scientific questions?
Y5 Spring 1	**<u>How do plants reproduce?</u>** **<u>Living Things and their Habitats</u>** (Life cycles, reproduction) **Living things and their habitats – Y4** • recognise that living things can be grouped in a variety of ways	**<u>Living things and their habitats</u>** • describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird • describe the life process of reproduction in some plants and animals.	**<u>Living Things and Their Habitats</u>** mammal, reproduction, insect, amphibian, bird, offspring, life cycle, seed, stem, root, bulb, pollen, stamen, stigma pollination,	

	• explore and use classification keys to help group, identify and name a variety of living • things in their local and wider environment • recognise that environments can change and that this can sometimes pose dangers to living things.		germination, seed formation, seed dispersal, plants, life processes, environment, growth, living.	
Y5 Spring 2	**<u>Why is reproduction vital for all living things?</u>** Animals Including Humans (Human development) **Animals including humans –Y2** • notice that animals, including humans, have offspring which grow into adults	**<u>Animals, including humans</u>** • describe the changes as humans develop to old age.	**<u>Animals Including Humans</u>** foetus, embryo, womb, gestation, baby/babies, toddler, infant, children, adolescent, adult, elderly, humans, animals, growth, age, birth, changes, stages, development, puberty, reproduction	
Y5 Summer 1	**<u>How Can We Change the State of materials?</u>** Properties & Changes of Materials **Uses of every day materials –Y2** • identify and compare the suitability of a variety of everyday materials, including • wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses • find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. • States of matter –Y4	**<u>Properties and changes of materials</u>** • 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	**<u>Properties and Changes of Materials</u>** hardness, solubility, transparency, conductivity, magnetic, filter, evaporation, dissolving, mixing, reversible, irreversible	

	• compare and group materials together, according to whether they are solids, liquids or gases • observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) • identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature	• give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic • demonstrate that dissolving, mixing and changes of state are reversible changes • explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.		

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Y5 Summer 2	**Forces** **Forces and Magnets– Y3** • compare how things move on different surfaces • notice that some forces need contact between two objects, but magnetic forces can act at a distance • observe how magnets attract or repel each other and attract some materials and not others • compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials • describe magnets as having two poles • predict whether two magnets will attract or repel each other, depending on which poles are facing.	**Forces** • explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • identify the effects of air resistance, water resistance and friction, that act between moving surfaces • recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.	**Forces** force, air resistance, water resistance, upthrust, friction, gravity, Newton, gears, pulleys, surfaces, speed, movement, Earth,	
Year group	**Prior Knowledge**	**New Knowledge**	**Vocabulary**	**Skills**
Y6 Autumn 1	**How should we power our world?** (Electricity) **Electricity –Y4** • identify common appliances that run on electricity • construct a simple series electrical circuit, identifying and naming its basic parts,	**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	cells, wires, bulbs, switches, buzzers, motors, battery, voltage/volt, components, circuit, complete circuit,	**Working scientifically – Breakdown for Y6** **Planning:** -Can they suggest questions to investigate?

	including cells, wires, bulbs, switches and buzzers • identify whether or not a lamp will light in a simple series circuit, based on whether or • not the lamp is part of a complete loop with a battery	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.	series circuit, simple circuit conductors, insulators, bright/dim, amps, volts, resistance, wire, electrical symbols	-Can they plan and carry out an investigation by controlling variables fairly and accurately? -Can they make a prediction with reasons? **Obtaining and presenting evidence:** -Can they take measurements using a range of scientific equipment with increasing accuracy and precision? -Can they explain why a measurement needs to be repeated? -Can they record more complex data and results using scientific diagrams, classification keys, tables, bar charts, line graphs. **Considering evidence and evaluating:** -Can they find a pattern from their data and explain what it shows? -Can they report findings from investigations through written explanations and conclusions? -Can they link what they have found out to other science?
Y6 Autumn 2	**Investigation 1** **Which ball is the bounciest?**			

	<u>Investigation 2</u> **How does the size of the jar make a difference to how long a candle burns?** **David Attenbrough (Explorify)**			
Y6 Spring 1	**<u>Why do we need rainforests?</u>** Living Things and their Habitats (classification) Living things and their habitats –Y4 • recognise that living things can be grouped in a variety of ways • explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment • recognise that environments can change and that this can sometimes pose dangers to living things Living things and their habitats –Y5 • describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird	**<u>Living things and their habitats</u>** • 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.	classification, classify, classification key, similarities, differences, characteristics, habitats, vertebrates, invertebrates, micro-organisms, amphibians, reptiles, mammals, birds, fish, fungus, arachnids, molluscs, crustaceans, insects, organisms, micro-organisms, plants, environment,	
Y6 Spring 2	**<u>Investigation 1</u>** **What makes a difference to how fast/far our balloon rocket will travel?** **<u>Investigation 2</u>** **Do children with the longest legs jump further?** **Alexander Fleming (Explorify)**			

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Y6 Summer 1	**<u>How Do Our Bodies Work and Grow</u>?** **Animals Including Humans** (circulatory system, diet, exercise , drugs, nutrients) **Animals including humans –Y3** • identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat **Animals including humans –Y4** • describe the simple functions of the basic parts of the digestive system in humans • identify the different types of teeth in humans and their simple functions	**<u>Animals including humans</u>** 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.	circulatory system, heart, pump, lungs, muscle, blood, blood vessels, veins, arteries, capillaries, aorta, pulmonary artery, pulmonary vein, atria/atrium, ventricle/s, oxygen, oxygenated, deoxygenated, valve, nutrients, transportation, respiration, exercise, diet, drugs, lifestyle, puberty	
Y6 Summer 1	**Light** **Light – Y3**	**<u>Light</u>** • recognise that light appears to travel in straight lines	Refraction/refract, reflection/reflect, light, light source, mirror,	

	• recognise that they need light in order to see things and that dark is the absence of Light • notice that light is reflected from surfaces • recognise that light from the sun can be dangerous and that there are ways to protect their eyes • recognise that shadows are formed when the light from a light source is blocked by an opaque object • find patterns in the way that the size of shadows change	• 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.	travel, straight lines, direction, distance, dark/darkness, block, absorb, shadow, opaque, translucent, transparent,	
Y6 Summer 2	**<u>Where do we come from? Where are we going to?</u>** **Evolution & Inheritance** Not taught before	**<u>Evolution and inheritance</u>** • 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.	fossils, adaptation, evolution, evolve, inherit/inheritance, genetics, genes, DNA, characteristics, reproduction, genetics, off spring, parent, suited, adapted, adaptation,	