Year 5 – Scientific Enquiry Skills

	Comparative Test	• Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
	Identify & Classify	• Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.
	Observation Over Time	• Taking measurements, using a range of scientific equipment with increasing accuracy and precision, taking repeat readings when appropriate.
	Pattern Seeking	• Using test results to make predications to set up further comparative and fair tests.
	Research & Communication	• Identify scientific evidence that has been used to support of refute ideas or arguments. • Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, line and bar graphs. • Reporting and presenting findings from enquiries (including conclusions, causal relationships and explanations of and a degree of trust in results) in oral and written forms such as displays and other presentations.

Types of Scientific Enquiry

Comparative / fair testing
Changing one variable to see its effect on another, whilst keeping all others the same.

Research
Using secondary sources of information to answer scientific questions.

Observation over time
Observing changes that occur over a period of time ranging from minutes to months.

Pattern-seeking
Identifying patterns and looking for relationships in enquiries where variables are difficult to control.

Identifying, grouping and classifying
Making observations to name, sort and organise items.

Skill Statements

Asking questions
Asking questions that can be answered using a scientific enquiry.

Making predictions
Using prior knowledge to suggest what will happen in an enquiry.

Setting up tests
Deciding on the method and equipment to use to carry out an enquiry.

Observing and measuring
Using senses and measuring equipment to make observations about the enquiry.

Recording data
Using tables, drawings and other means to note observations and measurements.

Interpreting and communicating results
Using information from the data to say what you found out.

Evaluating
Reflecting on the success of the enquiry approach and identifying further questions for enquiry.

Year 5

- ★ I can plan different types of scientific enquiry to answer questions
- ★ I can recognise and control variables where necessary.

- ★ I am beginning to use test results to make predictions to set up further comparatives and fair tests.
- ★ I am beginning to look for different causal relationships in my data

- ★ I can begin to recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why.
- ★ I can begin to suggest improvements to my method and give reasons.

- ★ I can take measurements, using a range of scientific equipment, with increasing levels accuracy and precision

- ★ I can record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables and bar and line graphs.

- ★ I can report and presenting findings from enquiries, including conclusions, causal relationships and explanations of results
- ★ I can choose how best to present data.

- ★ I can identify scientific evidence that has been used to report or refute ideas and arguments
- ★ I can use my results to identify when further tests and observations are needed.

Year 5 – Animals, including Humans

National Curriculum Objectives	Sticky Knowledge	Vocabulary
• **Describe the changes as humans develop to old age.**	• Different animals mature at different rates and live to different ages. Foetus, Embryo, Womb, Gestation, Baby, Toddler, Teenager, Elderly, Growth, Development, Puberty, Hormone, Physical, Emotional,	Foetus, Embryo, Womb, Gestation, Baby, Toddler, Teenager, Elderly, Growth, Development, Puberty, Hormone, Physical, Emotional, . Key Scientists: Linked Texts: Usborne Beginners Your Body Stephanie Pratt
Prior Learning	**Key Question(s):**	**Future Learning**
In Year 4 children should: • **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.**	• Do all animal embryos look the same? • How do humans change? • Why do humans change? • Are there any patterns between vertebrate animals and their gestation periods?	In Year 6: • 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.

Teaching Ideas

Week 1	Week 2	Week 3	Week 4	WOW Experiment
How can I describe the human life cycle?	How do we develop in the womb?	How do we change throughout puberty?	How do we change when we are senior?	Bridge building.

Year 5 – Living things and their Habitats

National Curriculum Objectives	Sticky Knowledge	Vocabulary
• Know the life cycle of different living things, e.g. Mammal, amphibian, insect bird. • Know the process of reproduction in plants. • Know the process of reproduction in animals.	• Different animals mature at different rates and live to different ages. • Some organisms reproduce sexually where offspring inherit information from both parents. • Some organisms reproduce asexually by making a copy of a single parent. • Different types of organisms have different lifecycles. Reproduction, Sexual, Asexual, Pollination, Dispersal, reproduction, fertilisation, pollination, male, female, young, mammal, metamorphosis, amphibian, insect, egg, embryo, bird, plant	Reproduction, Sexual, Asexual, Pollination, Dispersal, reproduction, cell, fertilisation, pollination, male, female, pregnancy, young, mammal, metamorphosis, amphibian, insect, egg, embryo, bird, plant .

Key Scientists	Linked Texts
Jane Goodall Hilde Mangold	Usborne Planet Earth Leonie Pratt Usborne Earthquakes & Tsunamis Emily Bone

Prior Learning	Key Question(s):	Future Learning
In Year 4 children should: • **Construct and interpret a variety of food chains, identifying producers, predators and prey** • **Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other.** • **Identify and name a variety of plants and animals in their habitats, including micro habitats.**	• What is a life cycle? • What types of life cycles are there? • Are life cycles the same? • Do plants reproduce in the same ways as us? • How do plants spread their seeds?	In Year 6: • Classify living things into broad groups according to observable characteristics and based on similarities and differences. • Give reasons for classifying plants and animals based on specific characteristics.

Teaching Ideas

Identify & Classify	Observation over time	Identify & Classify	Pattern Seeking		WOW Experience
How do plants reproduce?	How do plants reproduce asexually?	What is a life cycle?	Can I compare different life cycle?	How do mammals reproduce?	Shaving foam

Year 5 – Forces

National Curriculum Objectives	Sticky Knowledge	Vocabulary
• Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object and the impact of gravity on our lives. • Identify the effects of air resistance, water resistance and friction, which act between moving surfaces. • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.	• Air resistance and water resistance are forces against motion caused by objects having to move air and water out of their way. • Friction is a force against motion caused by two surfaces rubbing against each other. • Some objects require large forces to make them move; gears, pulley and levers can reduce the force needed to make things move Air resistance, Water resistance, Friction, Gravity, Newton, Gears, Pulleys, force, push, pull, streamline, mechanism, lever, cog, machine, pulley.	Air resistance, Water resistance, Friction, Gravity, Newton, Gears, Pulleys, force, push, pull, opposing, streamline, brake, mechanism, lever, cog, machine, pulley. Key Scientists: Isaac Newton Linked Texts: Iggy Peck Architect; Rosie Revere Engineer

Prior Learning	Key Question(s):	Future Learning
In Year 3 children should: • Compare how things move on different surfaces. • Know how a simple pulley works and use making lifting an object simpler • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Observe how magnets attract and 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 with attract or repel each other, depending on which poles are facing.	• What actually is a force? • How can a force act on an object? • How can we measure forces? • How does the changing the shape of the boat affect water resistance? • How can we use levers to lit more? • How do see-saws work? • Can you create a pulley system to lift a given load?	In KS3 children will learn about: • opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface • forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only) • change depending on direction of force and its size.

Teaching Ideas

Week 1	Week 2	Week 3	Week 4	Week 5	WOW Experience
What is gravity? 	What is air resistance? 	What is water resistance? 	What is friction? 	What is the difference between pulleys, levers and gears? 	Good Vibrations – sprinkles on a tight surface.

Year 5 – Earth & Space

National Curriculum Objectives	Sticky Knowledge	Vocabulary
• 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 • Describe the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.	• Stars, planets and moons have so much mass they attract other things, including each other due to a force called gravity. Gravity works over distance. • Objects with larger masses exert bigger gravitational forces. • Objects like planets, moons and stars spin. • Smaller mass objects like planets orbit large mass objects like stars. • All other objects are lumps of rock, metal or ice and can be seen because they reflect the light of stars. Earth, Sun, Moon, Axis, Rotation, Day, Night, Phases of the Moon, star, waxing, waning, crescent, Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune, planets, solar system, day, night, rotate, orbit, axis, spherical,.	Earth, Sun, Moon, Axis, Rotation, Day, Night, Phases of the Moon, star, constellation, waxing, waning, crescent, gibbous. Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune, planets, solar system, day, night, rotate, orbit, axis, spherical, geocentric, heliocentric. Key Scientists: Mae C Jemison Linked Texts: Ada Twist Scientist; Usborne Beginners 'Astronomy' by Emily Bone; Usborne Beginners 'Living in Space' by Bowman & Wheatley; Usborne Beginners 'The Solar System' by Emily Bone

Prior Learning	Key Question(s):	Future Learning
In Key Stage 1 and in Year 3 children should: • Understand changes in weather patterns and seasons. • Compare how things move on different surfaces. • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Describe magnets as having two poles. Predict whether two magnets with attract or repel each other, depending on which poles are facing	How does temperature/size/day length/year length change as you get closer/further to the sun? If the mass of the Earth is 80x that of the moon, why is the gravity at the Earth's surface only 6x greater than at the surface of the moon? Why do we have day/night/months/years/seasons? Why does day length change? What are the planets in the Solar System? What shape are the Earth, Moon and Sun?	In KS3 children will learn about: • Gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only) • Our Sun as a star, other stars in our galaxy, other galaxies • The seasons and the Earth's tilt, day length at different times of year, in different hemispheres the light year as a unit of astronomical distance

Teaching Ideas

Week 1	Week 2	Week 3	Week 4	Extra Questions	WOW Experience
Are the Sun, Earth and Moon the same shape?	Why do we have night and day?	What does the Moon's journey around the Earth look like?	How is the movement of the Earth, and other planets, relative to the Sun?		Citrus volcanoes

Year 5 – Materials (Mixtures & Separation)

National Curriculum Objectives	Sticky Knowledge	Vocabulary
• **Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. – This is not on the Year 5 section of the National Curriculum** • **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.**	• When two or more substances are mixed and remain present the mixture can be separated. • Some changes can be reversed and some can't. • Materials change state by heating and cooling. Solid, liquid, gas, particles, state, materials, properties, matter, melt, freeze, water, ice, temperature, process, condensation, evaporation, water vapour, energy, precipitation,	Solid, liquid, gas, particles, state, materials, properties, matter, melt, freeze, water, ice, temperature, process, condensation, evaporation, water vapour, energy, precipitation, collection, Key Scientists | Linked Texts

Prior Learning	Key Question(s):	Future Learning
In KS1 children should: • **Distinguish between an object and the material from which it is made.** • **Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.** • **Describe the simple physical properties of a variety of everyday materials.** • **Compare and group together a variety of everyday materials on the basis of their simple physical properties.** • **Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.** • **Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.**	• What are mixtures? • What does dissolve mean? • Which of the following dissolve in water: sugar, bicarbonate of soda, oil, coffees, malt vinegar and wax? • What is a saturated solution? • How can we separate mixtures? • How can we clean our dirty water?	In Year 5 children will: • 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. • Give reasons based on evidence from comparative and fair tests, for the particular uses of everyday materials, including wood, metals 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 this kind of change is usually not reversible, including changes associated with burning and the action of acid on bicarbonate of soda

Teaching Ideas

Week 1	Week 2	Week 3	Week 4	WOW Experience
What is the difference between soluble and insoluble?	**Can you recover a substance from a solution?**	**How can you use filtering, sieving and evaporation to separate mixtures?**	What is decanting?	Bubbles – Lava lamps

Year 5 – Materials (Changes)

National Curriculum Objectives

- 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.
- comparative and fair tests, for the particular uses of everyday materials, including wood, metals 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 this kind of change is usually not reversible, including changes associated with burning and the action of acid on bicarbonate of soda

Sticky Knowledge

- Sometimes mixed substances react to make a new substance. These changes are usually irreversible.
- Heating can sometimes cause materials to change permanently. When this happens, a new substance is made. These changes are not reversible.
- Indicators that something new has been made are: The properties of the material are different (colour, state, texture, hardness, smell, temperature)
- If it is not possible to get the material back easily it is likely that it is not there anymore and something new has been made (irreversible change)

Hardness, Solubility, Transparency, Conductivity, Magnetic, Filter, Evaporation, Dissolving, Mixing Material, conductor, dissolve, insoluble, suspension, chemical, physical, irreversible, solution, reversable, separate, mixture, insulator, transparent, flexible, permeable, soluble, property, magnetic, hard.

Vocabulary

Hardness, Solubility, Transparency, Conductivity, Magnetic, Filter, Evaporation, Dissolving, Mixing Material, conductor, dissolve, insoluble, suspension, chemical, physical, irreversible, solution, reversable, separate, mixture, insulator, transparent, flexible, permeable, soluble, property, magnetic, hard.

Key Scientists	Linked Texts

Prior Learning

In Year 4 children should:

- Compare and group materials together, according to whether they are solids, liquids or gases.
- Observe that some materials change state when heated or cooled, and measure and 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.

Key Question(s):

- The key question we want children to interrogate is "have we made a new substance?"
  - Wet clay → air-dried clay → fired clay.
  - Flour and water → dough → bread
- Add baking powder to vinegar, it fizzes up. Has a new substance been made? (Yes the gas was not in the vinegar as it wasn't fizzy, so it must have been made)
- When water is added to jelly and it is set, is it a new substance.
- When materials are heated or mixed with other materials they sometimes can be made to turn into new materials. The question is how would we know if it was a new material or the same material mixed differently?
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Future Learning

In KS3 children will learn about:

- the concept of a pure substance
  mixtures, including dissolving
- diffusion in terms of the particle model
- simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography
- the identification of pure substances

Teaching Ideas

Week 1	Week 2	Week 3	Week 4		WOW Experience
How can we group items? 	What are reversible changes? 	What are irreversible changes? 	What is thermal conductivity?