

Science Subject Intent

At Braeburn Primary and Nursery Academy, it is our intent that pupils will develop a fascination and love of **science**. Our science curriculum is structured to provide lessons to ensure children can;

Que**St**ion

Create

Expl**ai**n

Engage

Find

Collaborate

Explor**E**

We aspire to develop inquisitive, collaborative and creative scientists. Science lessons help build on the knowledge of the world that the children already have and further develop this understanding, so everyone reaches their full potential. The skills of 'working scientifically' underpin our science teaching and learning but can also be adapted and are used in other lessons when observing, thinking and planning in different lessons. We intend that the children understand and use scientific vocabulary appropriate for their stage of learning by carefully planning opportunities for oracy, enabling them to ask and answer questions, become effective communicators and use the specific scientific vocabulary. The children ask and answer questions about what they notice and treat the living and non-living environment with respect and sensitivity. They make careful observations and experiment in a practical way so they develop curiosity and an ability to be effective problem solvers, helping to equip them for challenges now and in the future. Science at Braeburn, provides a range of wider opportunities including family events, clubs and more recently outdoor activities which enrich the curriculum ensuring it is always engaging for the children and gives them more opportunities to build on their oracy skills.

Science Subject implementation

Our science curriculum consists of teaching the scientific areas of learning for each year group in each year. These have been planned to ensure progression is evident from the beginning of school, in EYFS (using the knowledge and understanding of the world) to Year 6 with a Science progression document made with each strand. Most lessons are enquiry based, providing children with authentic experiences, context and relevance for the key idea they have been learning. This allows children to make cross-curricular links and see how science relates to the world around them. The lessons follow a 3 part lesson plan structure to ensure consistency across the school as well as differentiating teaching to support all of our children.

- **The thinking bit** - making sure the children are properly equipped for learning the new concept/idea and that their prior knowledge has been assessed and discussed.
- **The learning bit** – Learning the new concept/idea and seeing it in action (*aiming to prove*).
- **The applying bit** – Challenging the children to question the idea and use the idea to solve a problem.
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Our school has a clear focus on the development of speech and language and allowing children to make links and embed key scientific vocabulary. We use working walls, visual prompts and pre-teach some vocabulary to enable children to develop a deeper understanding and apply it in different contexts. This also supports children to make links and develop their speaking and listening skills as well as their writing across the curriculum.

Science subject impact.

Our Science Curriculum is high quality, well thought out and is planned to demonstrate progression. If children are keeping up with the curriculum, they are deemed to be making good or better progress. In addition, we measure the impact of our curriculum through the following methods:

- A reflection on standards achieved against the planned outcomes of Scientific knowledge.
- A celebration of learning for each term which demonstrates progression across the school;
- Tracking of knowledge in pre and post learning quizzes, topic pages and KWL grids.
- Pupil discussions about their learning

Our engagement with the local environment ensures that children learn through varied and first hand experiences of the world around them. Frequent, continuous and progressive learning outside the classroom is embedded throughout the science curriculum. Through various workshops, trips and interactions with experts and local charities, children have the understanding that science has changed our lives and that it is vital to the world's future prosperity. Children learn the possibilities for careers in science, as a result of our community links and connection with national agencies including the STEM association. They learn from and work with professionals, ensuring access to positive role models within the field of science from the immediate and wider local community. From this exposure to a range of different scientists from various backgrounds, all children feel they are scientists and capable of achieving. The school's science provision is recognised by the achievement of the nationally recognised 'Primary Science Quality Mark', which the school currently holds at silver level.

Non-negotiables: Year 1

Unlocking learning through oracy	Vocabulary
<ul style="list-style-type: none"> • Speak clearly and loudly enough to communicate meaningfully. • Ask questions about matters of interest. • Start to answer questions with more than one word adding detail to their speech. • Start to understand how to take turns when speaking. • Start to listen to others and respond appropriately. • Speak in complete sentences after an adult has modelled this. • Begin to understand how to change language when speaking to different listeners, e.g. peers and adults. • Begin to use new vocabulary learned in daily sessions. 	<p>arm, leg, hand, foot, eyes, ears, mouth, nose, see, hear, taste, smell, touch, fish, amphibian, reptile, bird and mammal, herbivore, carnivore, omnivore, parent, baby</p> <p>deciduous, evergreen, plant, tree, leaf, stem, flower, petals, roots, Autumn, Winter, Spring, Summer, rain, snow, frost, wind, sun, fog, mist, clouds, temperature (warm/cold/freezing)</p> <p>object, material, wood, plastic, metal, water, rock, fabric</p> <p>property- everyday language e.g hard/soft, stretchy, rough, bendy, see-through, strong etc sort, waterproof</p> <p>float, sink, push pull</p> <p>eyes, sight, light, sun,</p> <p>ear, sound, hearing</p>
Working Scientifically	Knowledge

- Collect and record simple data (pictorial tally chart or bar chart)
- Find the answer to questions by using my senses and observing closely.
- Sort and group things together by their features
- Make simple measurements (non-standard)
- Record observations in simple drawings
- Communicate simple similarities and differences
- Observe things closely using a magnifying glass.
- Ask questions (Why? How? What if?)

Animals including humans:

- Name, compare/talk about some common; Fish, Amphibians, Reptiles, Birds and Mammals
- Identify simple similarities and differences between some common: Fish, Amphibians, Reptiles, Birds, Mammals
- Name some common: Carnivores, Herbivores and Omnivores and suggest things they might like to eat.
- Talk about what kinds of animals are kept as pets
- Label the human body using the correct science words.

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:

- Observe changes across the four seasons
- Observe and describe weather associated with the seasons and how day length varies

Materials and states of matter

- 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

Forces and magnets

- Explore floating and sinking, pushes and pulls.

Light:

- Know that we use our eyes to see

Sound:

- Exploring how to change the volume of a sound during music lessons.
- Know we use our ears to hear

Unlocking learning through oracy	Vocabulary
<ul style="list-style-type: none"> • Talk about topics that are of interest to them or which they enjoy. • Ask questions to gain information and clarify meaning. • Begin to develop and explain their ideas. • Express themselves using complete sentences when required. • Make more specific vocabulary choices, e.g. technical language. • Usually listen carefully and respond appropriately. • Take turns when talking in pairs or small groups. 	<p>offspring, adult, baby, parents dead, alive, never-alive habitat- desert, arctic, rainforest, ocean food chain, predator, prey diet seed, bulb, germination, temperature, sunlight, water, healthy, root, shoot squash, bend, twist, stretch</p>
Working scientifically	Knowledge
<p>-Ask questions and understand that they can be answered in different ways (testing, research) -Observe closely using a magnifying glass/microscope -Measure accurately using a ruler/simple measuring cylinder/simple thermometer -Sort and group objects and living things in different ways using their features, noticing similarities and differences. -Communicate my findings in pictures and words (or orally) Record results in a simple, prepared table. Talk about what they show</p>	<p>Animals including Humans Understand that animals, including humans, have offspring which grow into adults 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.</p> <p>iving things and their Habitats - 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 micro-habitats -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.</p> <p>Plants -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</p> <p>Materials and states of matter</p>

-Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses
-Describe how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching

Exploring

Electricity

Know that electricity is needed to make some things work.
Know that some appliances need batteries and some use mains electricity to work.

Forces

Explore cars moving quicker on different surfaces.

Sound

Exploring how to change the volume and pitch of a sound during music lessons.

Unlocking learning through oracy	Vocabulary
<ul style="list-style-type: none"> • Talk and listen confidently in different situations. • Show they have listened carefully by asking relevant questions. • Develop and explain their ideas giving reasons. • Sequence and communicate ideas in an organised and logical way in complete sentences as required. • Vary the amount of detail – dependent on purpose and audience. • Participate fully in paired and group discussions. • Show understanding of the main points in a discussion. 	carbohydrates, protein, fats, sugar, dairy, fruit and vegetables, balanced diet, energy skeleton,vertebrates/invertebrates, muscles, bones, ribs, skull, joints, spine, pelvis nutrients, photosynthesis, function magnet, magnetic, poles, north pole, south pole, magnetic force, attract, repel, metals, friction, force meter source of light, darkness, reflect, mirror,translucent,transparent,opaque,shadow Fossil, rock, sedimentary,soil, organic matter, crystals, molten rock, lava
Working scientifically	Knowledge
<ul style="list-style-type: none"> -Raise questions and consider the type of enquiry required (fair test, research, observation over time) -Recognise and set up a fair test enquiry (explain what has changed and what has stayed the same) -Take accurate measurements using standard measures; thermometer, ruler, data logger -Use appropriate scientific enquiry when recording. -Communicate my findings in a range of ways (pictures, words, see saw video) -Sort and classify objects in a variety of ways. -Use the results I have found to begin to draw conclusions. 	<p>Animals including Humans</p> <ul style="list-style-type: none"> -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. <p>Plants</p> <ul style="list-style-type: none"> -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 <p>Forces</p> <ul style="list-style-type: none"> -Compare how things move on different surfaces

- 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
- Describe magnets as having two poles Predict whether two magnets will attract or repel each other, depending on which poles are facing.

Light

- Recognise that he/she needs 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 eyes
- Recognise that light from the sun can be dangerous and that there are ways to protect eyes
- Find patterns in the way that the size of shadows change

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

Exploring

Sound

Exploring how to change the volume and pitch of a sound during music lessons.

Unlocking learning through oracy	Vocabulary
<ul style="list-style-type: none"> • Talk and listen confidently in a wide range of contexts. • Ask questions to clarify or develop understanding. • Give an answer and justify it with evidence. • Sequence, develop and communicate ideas in an organised and logical way in complete sentences as required. • Show understanding of the main points and significant details in a discussion. • Show they have listened carefully through making relevant comments. • Increasingly able to adapt what they say to meet the needs of the audience/listener. 	<p>molars, canines, incisors, esophagus, saliva, stomach, intestines, anus, digestion, nutrients, food chain, energy, producer, predator, prey, decomposer</p> <p>classify, classification, classification key, environment, deforestation, pollution, extinction, endangered, producer, decomposer.</p> <p>pollination, seed dispersal, stigma, anther, ovary, ovule, pollen, nectar.</p> <p>solid, liquid, gas, state, heat, cool, melt, freeze, evaporate, condense, thermometer, temperature, degrees celsius, The water cycle, precipitation, thermal insulator, electrical conductor/insulator</p> <p>Vibration, volume, pitch</p> <p>precipitation- snow, hail, rain</p>
Working scientifically	Knowledge
<ul style="list-style-type: none"> -Ask relevant questions and identify the relevant type of enquiry (fair test, research, observation over time, pattern seeking). -Observe closely and record my observation in words and with diagrams. -Identify the variables in a fair test enquiry (change , keep the same). -Use and begin to construct simple classification keys to sort and classify objects. -Take accurate measurements using; thermometers, rulers, measuring cylinders. -Use a Data logger to collect evidence. -Draw a simple table to record my evidence (observations, measurements) -Draw a simple bar chart to present my data -Present and explain my findings orally (see saw?) -Use the evidence from my results to draw simple conclusions (what did the evidence show?) -Evaluate my working methods and suggest improvements. 	<p>Animals including Humans</p> <ul style="list-style-type: none"> -Describe the simple functions of the basic parts of the digestive system in humans (LINK BACK: Y3 the different food groups our body needs- nutrients) -Identify the different types of teeth in humans and their simple functions -Construct and interpret a variety of food chains, identifying producers, predators and prey. <p>Living things and their habitats</p> <ul style="list-style-type: none"> -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 and have an impact on living things. <p>Plants</p> <ul style="list-style-type: none"> -Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. <p>Materials and states of matter</p> <ul style="list-style-type: none"> -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

-Know that some materials are good thermal insulators that prevent the transfer of heat from warm to cold.

Electricity

-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

Sound

-Identify how sounds are made, associating some of them with something vibrating

-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.

Exploring- seasonal changes

water cycle- different types of precipitation.

Unlocking learning through oracy	Vocabulary
<ul style="list-style-type: none"> • Talk and listen confidently in a wide range of contexts including some that are formal. • Engage the interest of the listener by varying their expression and vocabulary. • Adapt spoken language to the audience, purpose and context. • Explain the effect of using different language for different purposes. • Develop ideas and opinions with relevant detail. • Express ideas and options justifying a point of view. • Show understanding of the main points, significant details and implied meanings in a discussion. • Listen carefully in discussions, make contributions and ask questions that are responsive to others' ideas and views. • Confidently, vary the use and choice of vocabulary (including technical language) dependent on the purpose and audience. 	<p>puberty,life-cycle,reproduce</p> <p>life cycle, reproduction, pollination,fertilisation, asexual reproduction, seed dispersal, fruit, stigma, anther, ovary, ovule, pollen, nectar,</p> <p>dissolve, soluble, insoluble, solution, conductor, insulator, filter, filtering, filter paper, sieving, evaporation, reversible change, irreversible change, burning</p> <p>solar system, orbit, sphere, Earth's axis, planets (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune)</p> <p>gas giant, terrestrial planet, meteor, star, crater</p> <p>gravity, air resistance, water resistance, mechanism, machine, lever, pulley, gears, work</p>
Working scientifically	Knowledge
<p>-I can ask relevant questions and identify the appropriate type of enquiry(fair test, pattern seeking, research, observation over time)</p> <p>-Make careful, detailed, relevant observations.</p> <p>-Decide and explain how I will control the variables in a comparative or fair test enquiry</p> <p>-Take accurate measurements using different scientific equipment.</p> <p>-Explain why it's important to take repeated measurements.</p> <p>-Record and present my data in different ways:</p> <p>*Labelled scientific diagrams.</p> <p>*Classification keys.</p> <p>*Draw tables.</p> <p>*Construct bar charts and line graphs.</p> <p>-Make predictions about how other tests will work based on my results.</p> <p>-Communicate my findings in different ways (oral or written) presentation.</p> <p>-Draw conclusions and evaluate my working methods.</p> <p>-Talk about other experiments that have been done to support or disprove ideas.</p>	<p>Animals including humans</p> <p>-Describe the changes as humans develop to old age</p> <p>-(see Life Cycles - Living things and their habitats)</p> <p>Living things and their habitats</p> <p>-Describe the differences in the life cycles of a mammal, amphibian, insect and a bird.</p> <p>-Describe the life process of reproduction in some plants and animals.</p> <p>Materials and states of matter</p> <p>-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</p> <p>-Recognise that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</p>

	<ul style="list-style-type: none">-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-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 <p>Earth and space</p> <ul style="list-style-type: none">-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 <p>Forces and magnets</p> <ul style="list-style-type: none">-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

<p style="text-align: center;">Unlocking learning through oracy</p>	<p style="text-align: center;">Vocabulary</p>
<ul style="list-style-type: none"> ● Listen carefully and adapt talk to the demands of different contexts, purposes and audiences with increasing confidence. ● Ask questions to develop ideas and make contributions that take account of others' views. ● Use evidence to support ideas and opinions. ● Explain ideas and opinions – elaborating to make meaning explicit. ● Take an active part in discussions, taking different roles. ● Use hypothetical speculative language to express possibilities. ● Use Standard English fluently in formal situations. ● Debate an issue maintaining a focused point of view. 	<p>heart, blood, lungs, oxygenated, deoxygenated, plasma, platelets, red and white blood cells,plasma blood vessels, veins, arteries, pulse.</p> <p>adaptation, evolution.</p> <p>microorganism, germ, microbe,characteristic,Linnaean system.</p> <p>offspring,characteristic,adaptation, natural selection, identical, genes, Charles Darwin.</p> <p>cell, voltage, component, circuit diagram, symbol</p> <p>prism, periscope</p> <p>fossils</p>
<p>Working scientifically</p>	<p>Knowledge</p>
<p>-Ask relevant questions, choose and plan an appropriate enquiry (5 types of enquiry)</p> <p>-Describe how I will control the variables in a comparative/fair test enquiry.</p> <p>-Make detailed, relevant observations (deciding time intervals)</p> <p>-Take accurate measurements using scientific equipment (including repeated measurements)</p> <p>Conduct relevant research to support or refute my ideas.</p> <p>-Record data using:</p> <p>*Labelled scientific diagrams.</p> <p>*Classification keys.</p> <p>*Tables</p> <p>*Bar charts</p> <p>*Line charts</p> <p>-Draw conclusions from my results and describe causal relationships in results.</p> <p>-Communicate my findings in an oral presentation or written report with an introduction, conclusion and results.</p> <p>-Identify scientific evidence that has been used to support or refute ideas or arguments.</p>	<p>Animals including humans</p> <p>-Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood</p> <p>-Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function</p> <p>-Describe the ways in which nutrients and water are transported within animals, including humans.</p> <p>Living things and their habitats</p> <p>-Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals</p> <p>-Give reasons for classifying plants and animals based on specific characteristics.</p> <p>Plants</p> <p>-Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution</p> <p>Evolution and inheritance</p>

- 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

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.
- Notice how light can be split into different colours using a prism

Rocks

- Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago