

# Peel Hall Primary School Science Knowledge and Skills Progression Map

## Intent

At Peel Hall Primary School, we understand that children are naturally curious and we encourage this inquisitive nature throughout their time with us. Science fosters a healthy curiosity in children about our universe and promotes respect for the living and non-living. We believe science encompasses the acquisition of knowledge, concepts, skills and positive attitudes. Through the programmes of study in the National Curriculum science document children will acquire and develop these skills throughout their Primary years. We ensure that the Working Scientifically skills are built-on and developed throughout their school career so that they can use equipment, conduct experiments, build arguments and explain concepts confidently and continue to ask questions and be curious about their surroundings.

The 2014 National Curriculum for Science aims to ensure that all children:

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics;
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them;
- are equipped with the scientific skills required to understand the uses and implications of science, today and for the future. We understand that it is important for lessons to have a practical / skills-based focus, and that the knowledge can be taught through this using the outdoor environment where possible and appropriate.

## Implementation

Class teachers follow the Peel Hall Science curriculum grid when planning which has been developed to show progression through the year groups.

Teachers create a positive attitude to science learning within their classrooms and in the outdoor environment to reinforce an expectation that all children are capable of achieving high standards in science. Our whole school approach to the teaching and learning of science involves the following:

- Science Weeks, which open each new term, allow pupils to be engaged and develop knowledge, understanding and appropriate vocabulary through workshops led by professionals and teachers. Pupils are shown how to use scientific equipment, and the various 'Working Scientifically' skills in order to embed scientific understanding.

- Through our planning, we involve problem solving opportunities that allow children to find out for themselves. Children are encouraged to ask their own questions and be given opportunities to use their scientific skills and research to discover the answers. Planning involves teachers creating engaging lessons, often involving high-quality resources to aid understanding of conceptual knowledge.
- We build upon the learning and skill development of the previous years. As the children's knowledge and understanding increases, and they become more proficient in selecting, using scientific equipment, collating and interpreting results, they become increasingly confident in their growing ability to come to conclusions based on real evidence.

### **Impact**

The use of the outdoor learning environment developed at Peel Hall results in a fun, engaging, high-quality science education, that provides children with the foundations for understanding the world. Our engagement with the local environment ensures that children learn through varied and first hand experiences of the world around them.

We believe at Peel Hall that Science is good when:

- We apply our 'working scientifically skills' to solve problems, explore, observe and investigate.
- We ask questions and work together to discover the answers.
- Science has a wow factor and promotes a sense of awe and wonder.

## How science is assessed

**Assessment** for learning is continuous throughout the planning, teaching and learning cycle. However children are more formally assessed half termly in KS1 and KS2 using a variety of methods:-

- Observing children at work, individually, in pairs, in a group, and in classes
- Questioning, talking and listening to children through pupil voice
- Considering work/materials / investigations produced by children together with discussion about this with them
- Children's science and topic books.
- Data collected on the school tracking system indicating where each pupil is working (Below, At age Related Expectations or Above)

**Assessment /evidence** – Insight / Pupil voice/books / displays/photographs

**The school environment is a key resource used to support the learning of science at Peel Hall Primary School  
(Learning Science Outside the Classroom – LSOtC)**

**Each ½ Term will commence with a Science Week with workshops using outside professionals/visitors**

Year 1	Working Scientifically	Autumn	Spring	Summer
	<p><b>Observing:</b></p> <p>Can they find out by watching, listening, tasting, smelling and touching?</p> <p><b>Performing tests:</b></p> <p>Can they ask questions?</p> <p>Can they perform a simple test? Can they give a simple reason for their answers?</p> <p>Can they talk about similarities and differences?</p> <p><b>Recording Findings:</b></p> <p>Can they show their work using pictures, labels and captions?</p> <p>Can they out some information in a chart or table?</p>	<p>Travelling Science Workshop – Working Scientifically</p> <p><b>Everyday Materials - Physics</b> Identify and name materials/ describe properties/ compare and group.</p> <p><b>Vocab: wood, plastic, metal etc squashing, bending, twisting stretching, similar, different, heating, cooling .</b></p> <p><b>Investigation: Which materials allow the water to go through and which are waterproof?</b></p> <p>Observe and record seasonal Changes 1</p> <p><b>Vocab: Autumn, Winter, Spring, Summer, weather types and seasonal variation, day lengths.</b></p>	<p><b>Plants - Biology</b> Identify &amp; name plant and trees/basic structure flowering plants.</p> <p><b>Vocab: Petals, stem, leaf, bulb, flower, seed, stem, root, deciduous, evergreen, trunk, branch, root, tree and plant names.</b></p> <p><b>Investigation: Can a seed grow without water (different amounts of water)?</b></p> <p>Observe and record seasonal Changes 2</p>	<p><b>Animals Inc. Humans - Biology</b> Identify&amp; classify animal groups by structure.</p> <p><b>Vocab: living, non-living, birds, fish, amphibians, reptiles, mammals, invertebrates, carnivores, herbivores, omnivores, adapted to environment</b></p> <p><b>Animals Inc Humans – Biology 2:</b> Identify parts of human body/senses.</p> <p><b>Vocab: body parts we can see, senses, names of domestic animals, compare animal bodies, characteristics.</b></p> <p>Observe and record seasonal Changes 3</p>

Year 2	Working Scientifically	Autumn	Spring	Summer
	<p><b>Observing:</b> Can they use some scientific words to describe what they have seen and measured?</p> <p><b>Performing tests:</b> Can they carry out a simple fair test? Can they say whether things happened as they expected?</p> <p><b>Recording Findings:</b> Can they use text, diagrams, charts, tables to record their observations? Can they information form books to find things out?</p>	<p>Travelling Science Workshop – Working Scientifically</p> <p><b>Animals Inc. Humans - Biology</b> What do animals and humans need to stay alive and keep healthy? Why do we need to exercise? What kind of food is best for our bodies? Why is important to keep my body clean? (hygiene).</p> <p><b>Vocab: survival, balanced diet, hygiene</b></p> <p><b>Uses of Materials- Physics/Chemistry</b> Compare suitability of materials/ Changing shape. <b>Vocab. of materials: classify, compare, group, transparent, opaque, flexible, natural, manmade.</b></p> <p><b>Investigation:</b> Which materials are the best for making different toys? How do materials change when we heat them? How do materials change when we mix them with water? How do things move on different surfaces?</p>	<p><b>Animals Inc. Humans - Habitats – Biology</b> <b>Vocab: habitat, living, non-living, dead, adaptation, life processes, reproduce, Life cycle of plants &amp; animals (egg, chick, chicken, frog)</b></p>	<p><b>Plants –Biology</b> Seeds &amp; bulbs/ conditions for growth linked to where plants are found/ different ways of reproducing. <b>Vocab: bulb, Seed</b> <b>Investigation:</b> Can a seed grow without light? Does the temperature affect the germination of a bean?</p>

Year 3	Working Scientifically	Autumn	Spring	Summer
	<p><b>Planning:</b></p> <p>Can they make and record a prediction before testing?</p> <p>Can they plan a fair test and explain why it was fair?</p> <p><b>Testing:</b></p> <p>Can they measure using different equipment and units of measure?</p> <p>Can they record their findings in different ways?</p> <p>Can they use their findings to draw a simple conclusion?</p> <p><b>Evaluating:</b></p> <p>Can they explain what they have found out and use their measurements/ observations to say whether it helps to answer their question?</p>	<p>Travelling Science Workshop – Light and Sound</p> <p><b>Light - Physics</b></p> <p>Light to see/ sun protection/ <b>Vocab</b> : shadow, source, reflection, bright dim, transparent, translucent, opaque.</p> <p><b>Investigation:</b></p> <p>What happens to a shadow if you change the angle of the light source? How can the size of a shadow be changed? How does the brightness of the light source affect a shadow?</p> <p><b>Rocks – Chemistry/Biology</b></p> <p><b>Properties of rocks/fossils</b> <b>Vocab</b>: sedimentary, igneous, impermeable, link properties and uses.</p>	<p><b>Animals Inc. humans - Biology</b></p> <p>nutrition/ movement/ <b>Vocab</b>: nutrients, water/ oxygen transportation, balanced diet, skeletal and muscular system.</p> <p><b>Forces &amp; Magnets – Physics</b></p> <p><b>Vocab</b>: magnetic, attract, repel, poles.</p> <p>Investigation: Is the biggest magnet always the strongest? Do magnets work through different materials ie table/ foil? Do magnets work in water? How many pieces of paper will stop a magnet working? How far away can a magnet attract a paperclip? Are two magnets stronger than one?</p>	<p><b>Plants - Biology</b></p> <p>Functions of flowering Plants/ requirements for growth. <b>Vocab</b>: function of parts, water transportation, pollination, seed formation, dispersal, plants and environment.</p> <p><b>Investigation:</b></p> <p>Which brand of tomato seed grows best? Do plants need their leaves so they can stay healthy? Which seed germinates most quickly?</p>

Year 4	Working Scientifically	Autumn	Spring	Summer
	<p><b>Planning:</b> Can they plan a fair test and isolate variables, explaining why it was fair?</p> <p>Can they decide which information needs to be collected and which is the best way for collecting it?</p> <p><b>Testing:</b></p> <p>Can they take measurements/ observations using different equipment and units of measure and record what they have found in a range of ways?</p> <p><b>Evaluating:</b></p> <p>Can they find any patterns in their evidence?</p> <p>Can they make a prediction based on something they have found out?</p> <p>Can they use scientific evidence to answer questions or to support their findings?</p>	<p>Travelling Science Workshop – Light and Sound</p> <p><b>Sound – Physics</b>  <b>Vocab: vibration, pitch, volume, sound insulation, transmitted.</b></p> <p><b>Investigation:</b></p> <p>What happens to the sound of a ticking clock when we wrap it in layers of bubble wrap? How can you use two polystyrene cups and a length of string to talk to each other? How can you change the pitch of a note when blowing across a bottle using water?</p> <p><b>Electricity – Physics</b>  <b>Why are cautions necessary when working with electricity?</b>  <b>Vocab: appliance, series circuits, components, switches, cells, wires, buzzers, conductors, insulators.</b></p> <p><b>Investigation:</b></p> <p>Which materials make the best electrical switches? Use that material to design a burglar alarm which is tripped when a door opens (use cardboard box lid to simulate door).</p> <p><b>Chemist: Michael Faraday</b></p>	<p><b>Changing Materials - Chemistry</b>  Mixing Materials/ Irreversible and reversible changes/ Changes of state/ temperature and water/ water cycle  <b>Vocab: solid, liquid, gas, heating, cooling, filter, evaporation, condensation, temperature, thermal conductors and insulators.</b></p> <p><b>Investigations:</b></p> <p>Do a salty and a freshwater ice cube take the same time to melt? What's the best way to stop an ice cube melting in the classroom? How long does it take water to evaporate in different parts of the playground? Why? Understand how the water cycle works (simulate with large bottle, hot water at bottom and ice in inverted lid/ funnel at top).</p> <p><b>Animals Inc. humans – Biology</b> human digestion/ human teeth/ food chain/ Can they explain how people, weather and environment can affect living things?</p> <p><b>Vocab: digestive system, molar, canine etc, herbivore, carnivore, food chain, food webs, producer, predator, prey</b></p> <p><b>Investigation:</b> What causes tooth decay? (Place hard boiled eggs in solutions of vinegar/sugar/water) observe changes</p>	<p><b>Living things and their habitats – Biology</b> Grouping Animals and Plants –/ classification keys/ changing environments.</p> <p><b>Vocab: animal groups, plant groups, keys, tree diagrams</b> Can they compare the classification of common plants and animals to living things found in other places? (under the sea, prehistoric) Do they recognise that environments can change and this can pose a danger to living things?</p> <p><b>Scientist: Carl Linnaeus (classification system)</b></p>

Year 5	Working Scientifically	Autumn	Spring	Summer
	<p><b>Focus will be on developing own questions to investigate in Y5 and Y6</b></p> <p><b>Planning:</b> Can they plan and carry out a scientific enquiry to answer questions, including recognising and controlling variables? Can they make a prediction with reasons? Can they vary one factor whilst keeping the others the same in an experiment?</p> <p><b>Testing:</b> Can they take measurements /observations using a range of scientific equipment with increasing accuracy and precision? Can they take repeat readings when appropriate?</p> <p><b>Evaluating:</b> Can they report and present findings through written explanations, conclusions including graphs? Can they suggest how to improve their work and say why they think this?</p>	<p><b>Earth and Space - Physics</b></p> <p><b>Vocab: movement of the Earth, planet movements, day and night, seasons, orbit, rotate, axis, phases of moon.</b></p> <p><b>Investigations e.g:</b> Why do we have night and day and why does their length change throughout the year? Why do we have four different seasons? Would there be life on Earth without the sun? Why is the Earth the only habitable planet in our solar system?</p> <p><b>Astronomist: Caroline Herschel, Edwin Hubble</b></p> <p><b>Astronaut: Tim Peake</b></p> <p><b>Forces and  Motion – Physics</b> <b>Vocab: push, pull, Newton, gravity, air resistance, water resistance, friction, opposite force, levers, pulleys, gears.</b></p> <p><b>Investigation eg:</b> Why do boats float? Design a parachute which keeps an object in the air for the longest time. How can I stop a penny from sinking? <b>Scientist: Isaac Newton</b></p>	<p><b>Living things &amp; Habitats – Biology</b> Differences in life cycles of animal groups/ life processes of reproduction in plants and animals – humans (puberty). <b>Vocab: adaptation, special features, environments, Life Cycles- butterfly/ dragonfly, a mammal, amphibian, bird.</b> Compare life cycles of plants and animals in local environment and e.g rainforest?</p> <p><b>Naturalists - David Attenborough and Jane Goodall</b></p> <p><b>Animals Inc. humans – Biology</b> Human changes to old age. Why is sleep necessary?</p>	<p><b>Properties and changes of materials, Separating mixtures of materials – Chemistry Vocab: dissolve, melt, burn, reversible &amp; irreversible changes, sieving, filtering, evaporating, soluble, insoluble</b></p>



Year 6	Working Scientifically	Autumn	Spring	Summer
	<p><b>Focus will be on developing own questions to investigate in Y5 and Y6</b></p> <p><b>Planning:</b></p> <p>Can they explore different ways to test an idea, choose the best way and give reasons? Can they make a prediction which links with other scientific knowledge?</p> <p><b>Testing:</b></p> <p>Can they plan in advance which equipment they will need and use it well?</p> <p>Can they record their measurements and observations systematically?</p> <p><b>Evaluating:</b></p> <p>Can they draw conclusions from their work? Can they identify scientific evidence that has been used to support or refute ideas and arguments?</p>	<p><b>Electricity – Physics</b></p> <p>Voltage and bulb brightness/ variations in how components function/ circuit symbols. (KS2 Bright Sparks Science Workshop)</p> <p><b>Vocab: appliance, series circuits, components, switches, cells, wires, buzzers, conductors, insulators.</b></p> <p><b>Investigations:</b> Which materials make the best electrical switches?</p> <p><b>K.U.O.W.</b></p> <p><b>Why are cautions necessary when working with electricity?</b></p> <p><b>Evolution and Inheritance – Biology</b></p> <p>Living things change over time.</p> <p><b>Vocab: fossils, offspring vary, adaptation and evolution</b></p> <p><b>Palaeontologists: Mary Anning, Charles Darwin, Alfred Wallace</b></p>	<p><b>Animals Inc. Humans- Biology</b></p> <p>Human circulatory System/ Impact of diet/drugs on body/ transport of nutrients &amp; water within animals inc. humans</p> <p><b>Vocab: arteries, veins, capillaries, carbon dioxide, oxygen, blood supply, pulse, health risks, exercise, healthy eating.</b></p> <p><b>Scientist: Dorothy Crowfoot Hodgkin Gertrude B Elion</b></p>	<p><b>Living things and their habitats – Biology</b></p> <p>Classification of plants and animals/ reason for classification</p> <p><b>Light and Shadows– Physics</b></p> <p><b>Vocab: Travels in straight lines, how we see, shape of shadows.</b></p> <p><b>Investigations:</b></p> <p>How do submarines see what is going on above them? Investigate making periscopes using juice boxes and mirrors. How can you tell the time using a sundial? What material creates the strongest shadow?</p>

