



Knowledge and skills: Introduction

At Polehampton, we first considered the concept of knowing more, doing more and remembering more. Therefore, from our research, we have a shared and consistent understanding of different types of knowledge. Each subject will have a different ratio of distribution for these types of knowledge, and the types of knowledge can (and most often do) intersect.

1. Knowledge refers to the body of facts, information, understanding, principles and concepts etc. of a subject. In other words, this could be referred to as the main component knowledge that pupils might learn (e.g. knowing the life cycle of a plant or the properties of materials), as well as the understanding that pupils may develop about how those facts were established (aka disciplinary knowledge). Finally, as well as considering how a fact was established, we may also consider its degree of certainty and how it continues to be revised. Pupils need to know information in some form in every subject, even in practical subjects, because there will be an element of theory behind the skill that can be shown/displayed.

2. Skills refers to the techniques required to complete a procedure or task. It is the 'know how' of the processes required in a subject (e.g. the actual skill of being able to record accurately when conducting an experiment). Skills are often incremental and require regular practice. It is about being able to know how to demonstrate that skill or procedure.



Polehampton's Infographic on Knowledge and Skills

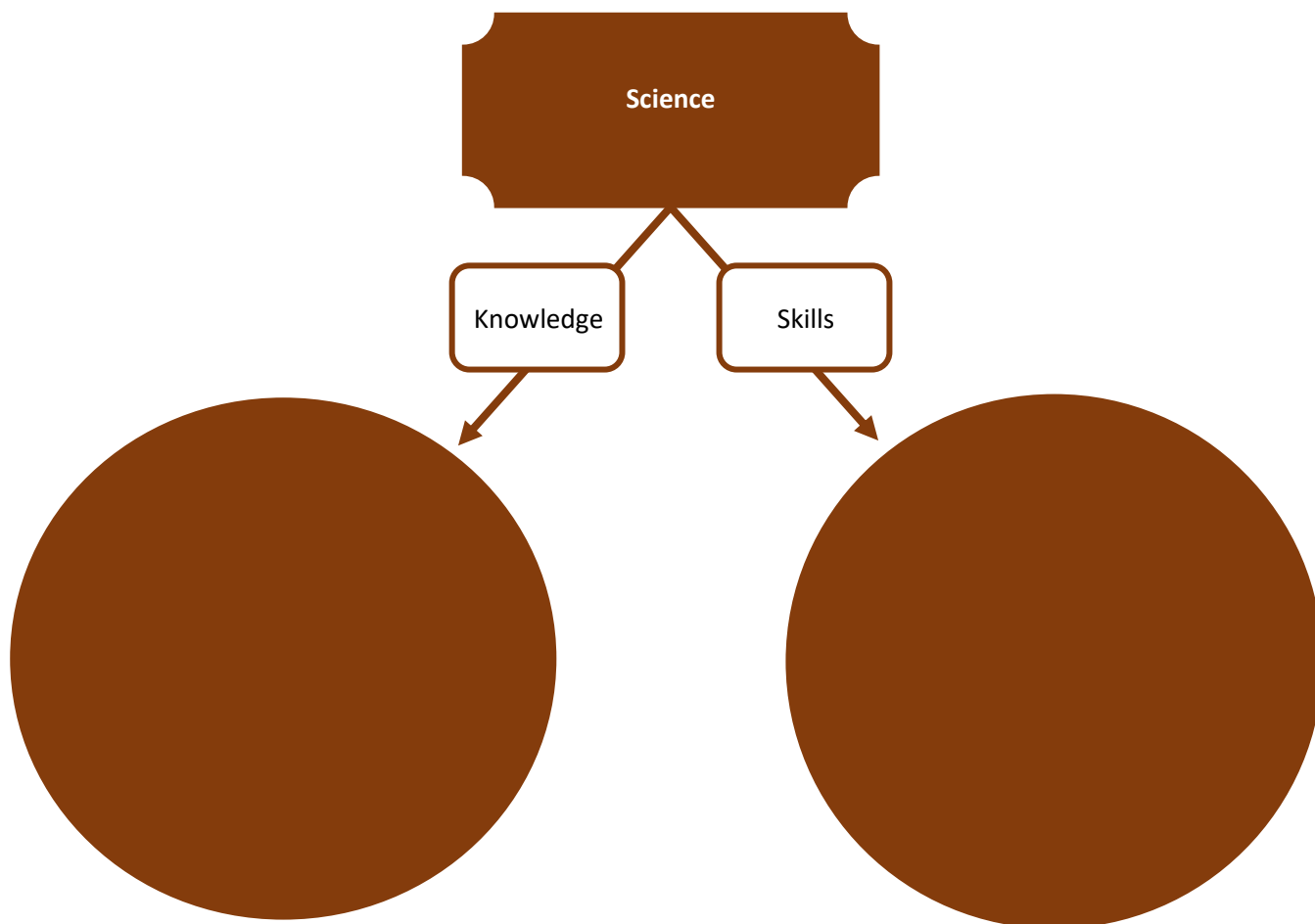
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Knowledge distribution

We recognise that different subjects have different weightings of knowledge and skills. The infographic below highlights what we consider to be the ratio of each form of knowledge within this subject:



Our vision

It is our intention to develop, in all pupils, a lifelong curiosity and interest in the sciences. Science lessons will nurture this curiosity and allow pupils to ask questions and develop the skills they need to answer those questions. With this in mind, we acknowledge the transferable nature of science learning to other subjects, such as critical thinking, questioning and analysing information for accuracy. We aim for pupils to utilise their knowledge and skills of scientific concepts effectively in their everyday lives.

When planning for the science curriculum, we intend for children to have the opportunity, wherever possible, to learn through varied and systematic investigations, leading to them being equipped to ask and answer scientific questions about the world around them, now and in later life. As children progress through the year groups, they build on their skills by working scientifically, as well as on their scientific knowledge. In turn, this allows pupils to develop greater independence in planning and carrying out fair and comparative tests to answer a range of scientific questions. The bespoke science scheme of work ensures that children have a varied, progressive and well-mapped-out science curriculum that provides the opportunity for progression across the full breadth of the Curriculum for Science in KS1 and KS2. Science lessons are valued and provide the opportunity for pupils to participate in the widest variety of experiences to support their current education and to provide a foundation for future education and career choices.

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Our vision is for pupils to leave our school highly knowledgeable, skilled and equipped for new opportunities in modern society.

Early Years Foundation Stage

In the Early Years Foundation Stage (EYFS), the foundations for Science are primarily developed through the area of Understanding the World, where children are encouraged to explore, observe and ask questions about the natural world. They investigate plants, animals, materials and seasonal changes, using their senses to notice similarities, differences, patterns and change. This is supported by opportunities for hands-on exploration, both indoors and outdoors, which develop early enquiry skills such as observing, predicting and questioning. Communication and Language also play a key role, helping children articulate their findings and engage in scientific talk. These early experiences directly support the National Curriculum for Science, which begins in Key Stage 1 with pupils identifying, classifying, and describing the world around them, using observation and simple testing. EYFS science learning is practical, exploratory and embedded in play, providing the curiosity and foundational skills needed for structured scientific enquiry and understanding in later key stages.

Key Stage 1

In Key Stage 1 (KS1), our Science curriculum focuses on developing pupils' knowledge, curiosity and observational skills through first-hand exploration of the natural and physical world. Pupils study key areas including plants, animals (including humans), materials and seasonal changes, learning to identify, name, compare and group a variety of living things and everyday materials. They begin to understand basic structures and life processes, such as growth, reproduction and health. A central aim is to develop pupils' ability to work scientifically; this includes asking questions, observing closely, performing simple tests, identifying and classifying, and gathering and recording data. Learning is practical, with a strong emphasis on using the local environment to observe changes over time and notice patterns. The KS1 science curriculum lays the foundations for deeper scientific enquiry and conceptual understanding in KS2, building confidence and encouraging children to explore the world around them with curiosity and care.

Key Stage 2

In Key Stage 2 (KS2), the Science curriculum extends pupils' knowledge and understanding of the natural and physical world through a broader and more detailed study of scientific concepts. Pupils explore topics such as plants, animals (including humans), living things and their habitats, rocks, light, forces and magnets, states of matter, sound, electricity, Earth and space, and evolution and inheritance. They are taught to apply a range of scientific enquiry skills, including planning and carrying out fair tests, observing over time, identifying and classifying, and using data to draw conclusions. Emphasis is placed on using scientific language accurately, developing reasoning and making connections between ideas. The curriculum encourages pupils to think critically, ask meaningful questions and understand the role of science in everyday life and the wider world.

Letting our lights shine through experiences

To complement the curriculum, there are visiting workshops, themed class events and educational visits, which enhance pupils' understanding and provide varied learning experiences.

The curriculum, structure and planning

At Polehampton, we follow the National Curriculum for all our subjects. The curriculum is organised to ensure coverage of the Primary Science National Curriculum units. Science lessons are taught through the year, with one unit per half term (4 units per year in KS1 and 5 units per year in KS2). Units of lessons are sequential, allowing children to build their skills and knowledge, applying them to a range of outcomes and making cross curricula links where possible. In the second half of the summer term, all year groups have a specific focus on 'working scientifically' where they use retrieval practice to revisit topics previously taught throughout the academic year as well as taking part in Science Days.

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Science lessons are valued and provide the opportunity for pupils to participate in the widest variety of experiences, which support their current education and to provide a foundation for future education and career choices. Pupils are encouraged to utilise their knowledge and skills in Scientific concepts, effectively in their everyday lives. The acquisition of key scientific knowledge is an integral part of our science lessons and the teaching, and pupil demonstration of useful and powerful vocabulary is fundamental to each unit of learning, incorporated into lesson plans and shared with pupils. The progression of skills for working scientifically, are developed through the year groups and scientific enquiry skills are of key importance within each lesson.

Our investigative approach to Science teaches pupils to think about the processes involved in their learning, by making links between different areas of Science and utilising these across a range of curriculum areas. Science is taught weekly, for at least 2 hours in all year groups, with the exception of EYFS who integrate Science into 'Understanding the World' activities. In every lesson, teachers model key investigation skills, sparking conversation with pupils before they complete a range of independent investigations and hands-on activities, while gaining scientific knowledge. Collaborative learning is encouraged, and investigative skills are explicitly taught, practised and assessed across the lesson and at the end of the learning module. Children are encouraged to relate the modules of Science, to real life experiences. The curriculum provides opportunities to challenge the more able pupils in this subject through differentiated activities, targeted questioning and opportunities to design and answer their own investigative questions.

There are opportunities to regularly review and evaluate children's understanding and practical investigation skills at the end of unit and academic year. Lesson activities are adapted (where needed and applicable) so that all children have an appropriate level of support and challenge. Each lesson has a clear focus, and scientific knowledge and enquiry skills are developed with increasing depth and challenge as children move through the year groups. EYFS and KS1 focus on the fundamentals of knowledge and investigation and KS2 then builds on these fundamental skills with further opportunities to build greater depth. Teachers model key investigation skills, and pupils complete independent investigations and hands-on activities while gaining the scientific knowledge for each unit. Teachers are encouraged to provide as many opportunities for investigation skills and vocabulary as possible.


Building on and revisiting learning

Our units rely on a 'spiral curriculum' model, which ensure we can revisit concepts and cumulatively build knowledge and skills. The spiral structure means that key concepts are revisited and deepened each year, helping pupils to build on prior learning in a consistent and meaningful way. Although we do not use Kapow for Science, this graphic below illustrates our spiral curriculum model:

A spiral curriculum

The scheme of work has been designed as a spiral curriculum with the following key principles in mind:

- ✓ **Cyclical:** Pupils return to the key knowledge and skills again and again during their time in primary school.
- ✓ **Increasing depth:** Each time a skill is revisited it is covered with greater complexity.
- ✓ **Prior knowledge:** Prior knowledge is utilised so pupils can build upon previous foundations, rather than starting again.



Taken from Kapow Primary's LTP document

Concepts

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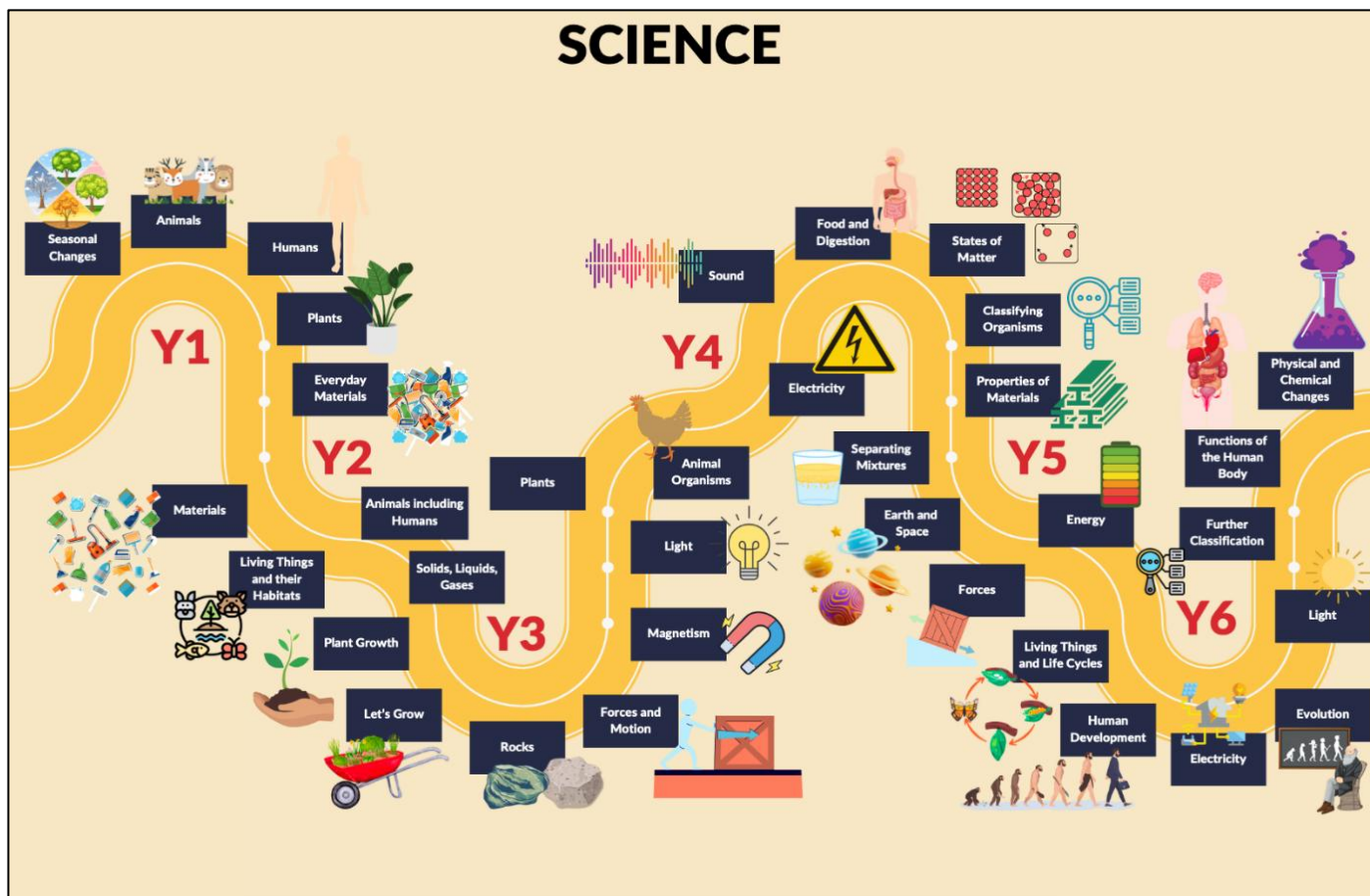
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Each subject has concepts which run through every unit and year group. These concepts allow consistency of focus and progression within each concept from unit to unit and year to year. Our key concepts are as follows:

- Scientific knowledge and understanding: observing, studying and explaining the physical world.
- Working scientifically: using different methods of scientific enquiry to understand the world around us.
- Science in action: how science can be used and its impact on our day-to-day lives.

Scientific knowledge and understanding	Working scientifically	Science in action
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Vocabulary development and knowledge organisers

As part of our focus on oracy, we utilise the explicit language highlighted in the National Curriculum and use this within our plans, which outline the key vocabulary for that lesson or unit, which allows progression in vocabulary development over each unit and year.

A knowledge organiser, in line with our school's format, is shared with pupils from the beginning of the unit and referred to throughout lessons to help embed key concepts and vocabulary. We do not have a knowledge organiser for our summer 2 retrieval practice investigations, as these are based on the information from the previous units' knowledge organisers.

Cross curricular links

It is important to understand how subjects can work with each other, so there are specific links to other subjects

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outlined in a specific document to support the wider curriculum development of each subject. However, it is important to note that this does not detract from the focus we have on teaching each unit as part of a discrete subject.

Links with our values, spirituality and organisations

The Science curriculum at Polehampton not only builds knowledge and practical skills but also plays a vital role in pupils' personal development and understanding of their place in the world. It aligns with wider frameworks such as the British Values, United Nations Sustainable Development Goals, and OECD Learning Compass 2030, while reflecting our school values of love, aspiration, curiosity, respect and courage.

British Values

Science promotes Democracy through collaborative working, peer discussion, and shared decision-making during investigations. Pupils learn the importance of the Rule of Law through fair testing, accuracy and the ethical use of data. Individual Liberty is supported as pupils develop their own ideas and hypotheses. Mutual Respect and Tolerance are embedded as children consider different scientific perspectives and reflect on the global and cultural impact of discoveries, such as in environmental or health-related topics.

UN Sustainable Development Goals

Science at Polehampton links to several key UN goals:

- **Goal 3 – Good Health and Wellbeing:** through learning about human biology, healthy lifestyles and the impact of exercise and diet.
- **Goal 4 – Quality Education:** by providing inclusive, enquiry-based learning for all pupils.
- **Goals 7 and 13 – Affordable Clean Energy and Climate Action:** by exploring renewable energy, ecosystems and environmental change;
- **Goal 15 – Life on Land:** by understanding biodiversity, life cycles and conservation through the study of habitats and living things.

OECD Learning Compass 2030

Science supports the OECD's vision for future-ready learners by encouraging the following:

- **Critical thinking and problem-solving:** as pupils investigate real-world questions.
- **Scientific literacy:** enabling them to analyse and evaluate information and make informed decisions.
- **Collaboration and communication:** as they work in groups to plan, carry out, and reflect on scientific enquiries.
- **Agency and responsibility:** empowering pupils to consider the impact of science and technology on society and the planet.

Our School Values

- Love is fostered through learning about the human body, care for living things and a respectful approach to environmental responsibility.
- Aspiration is encouraged as pupils are inspired by scientists, develop their skills and see Science as a gateway to future opportunities.
- Curiosity drives all scientific enquiry, with pupils encouraged to ask questions, explore ideas and seek out explanations.
- Respect is reinforced through careful collaboration, ethical considerations in Science and an appreciation of the natural world.
- Courage is shown when pupils take intellectual risks—formulating hypotheses, testing ideas, learning from mistakes, and thinking independently.

Science at Polehampton equips pupils not just with knowledge, but with the mindset and values they need to contribute positively to their communities and the wider world.

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Assessment opportunities

Teachers use a balance of formative and summative assessment to monitor progress, inform planning, and ensure that all pupils are developing both scientific knowledge and skills.

Formative assessment

Formative assessment is embedded throughout Science lessons. Teachers continuously assess pupils' understanding in the following ways:

- Questioning and class discussion to probe thinking and clarify misconceptions.
- Observing pupils during practical work to assess their use of scientific skills such as predicting, measuring and drawing conclusions.
- Reviewing children's written work, diagrams and recordings of experiments.
- Using TAPS focused task examples, which are quick, manageable activities designed to assess specific enquiry skills (e.g. identifying variables, making observations, or recording results).

These formative strategies help teachers adapt their teaching in real time, address gaps, and provide targeted support or challenge as needed.

Summative assessment

At the end of each unit, summative assessment focuses on both scientific knowledge and working scientifically skills. Teachers use the following methods to assess summatively:

- Written summative assessments to assess the knowledge element of the subject.
- Sonar and internal tracking methods to track pupil attainment against age-related expectations.
- Concept cartoons, quizzes and annotated pupil work to capture evidence of understanding.
- Practical investigations or challenges that allow pupils to demonstrate a range of enquiry skills and apply their learning in context.

Assessment outcomes are used to inform reports to parents, track progress across the year, and support transition between year groups. Overall, science assessment at Polehampton ensures that children are not only gaining factual knowledge but also becoming confident, curious and capable scientific thinkers.

Measuring impact

We measure the effectiveness of our curriculum in the following ways:

- Pupil data tracking (Sonar and other internal tracking methods)
- Work scrutiny
- Monitoring of lessons and planning (including from SLT, governors and external validation, e.g. TKAT)
- Pupil conferencing.

When evaluating our curriculum, we also ask ourselves the following questions:

Do we provide a high-quality curriculum and inspires pupils?

- To what extent do our children show independence, resilience and high aspirations in the subject?
- To what extent does our curriculum provide new experiences and challenges?
- To what extent do the children engage with high quality resources?

Do we ensure pupils know more, do more and remember more?

- To what extent do children retain the knowledge learnt?

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- To what extent does the curriculum build over time?
- To what extent do children make progress against milestones over time?

Does our curriculum allow oracy development and the opportunity for pupils to collaborate?

- To what extent does our curriculum use/teach high quality language?
- To what extent does the curriculum provide opportunities to work collaboratively?
- To what extent does the curriculum support children with oracy skills?

Is our curriculum inclusive?

- How well is learning broken down, explained and scaffolded/adapted appropriately in the subject?
- How well are assessment forms used to inform planning in the subject?
- To what extent does the curriculum meet the needs of all learners including SEND/ EAL etc?

Do we help our pupils become better people in the wider world and prepare them for life in Modern Britain?

- To what extent does the curriculum allow children to take responsibility for their learning?
- To what extent does our curriculum allow for diversity?
- To what extent does the curriculum offer opportunities to present work in creative ways?
- To what extent does the curriculum offer opportunities to discuss content and/or questions and consider them in an open forum?
- To what extent does offer opportunities to utilise the skills of the wider community?

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