Lord Blyton Primary School- **Science**

Kapow Scheme

Long Term Plan

Science

Long-term plan

Standard

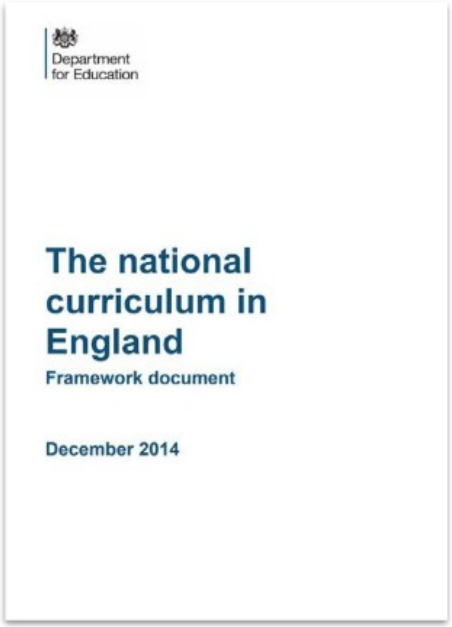
This standard Long-term plan is a 36-week plan.

This document is regularly updated to reflect updates to our website. This version was created on 29.03.24. The latest version can always be found here.

Contents:

How does Kapow Primary help our school to meet the statutory guidance for Science?

Our scheme of work fulfils the statutory requirements outlined in the **National curriculum (2014)** and was designed with recommendations of the Ofsted Research review series: science and Finding the optimum: the science subject report in mind.


Department for Education

The national curriculum in England

Framework document

December 2014


Ofsted raising standards improving lives

Research and analysis

Research review series: science

Published 29 April 2021

Applies to England

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Introduction

This review explores the literature relating to the field of science education. Its purpose is to identify factors that can contribute to high-quality school science curriculums, assessment, pedagogy and systems. We will use this understanding of subject quality to examine how science is taught in England's schools. We will then publish a subject report to share what we have learned.

The purpose of this research review and the intended audience is outlined more fully in the 'Principles behind Ofsted's research reviews and subject reports' [Footnote 1]

Since there are a variety of ways that schools can construct and teach a high-quality science curriculum, it is important to recognise that there is no singular way of achieving high-quality science education.


Ofsted raising standards improving lives

Research and analysis

Finding the optimum: the science subject report

Published 2 February 2023

Applies to England

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Executive summary

Science helps us to answer our biggest questions and to meet our most basic needs: from explaining the deepest mysteries of the universe to the structure of elementary particles that form atoms. The findings of science have fundamentally shaped every aspect of our world. Science drives innovation, creating new knowledge to help us solve current and future problems. All young people are entitled to a high-quality science education, to the curiosity it engenders and the understanding and the opportunity it brings.

How does Kapow Primary's scheme of work align with the National curriculum?

Our scheme of work fulfils the statutory requirements outlined in the **National curriculum (2014)**. The National curriculum Programme of Study for Science aims to ensure that all pupils:

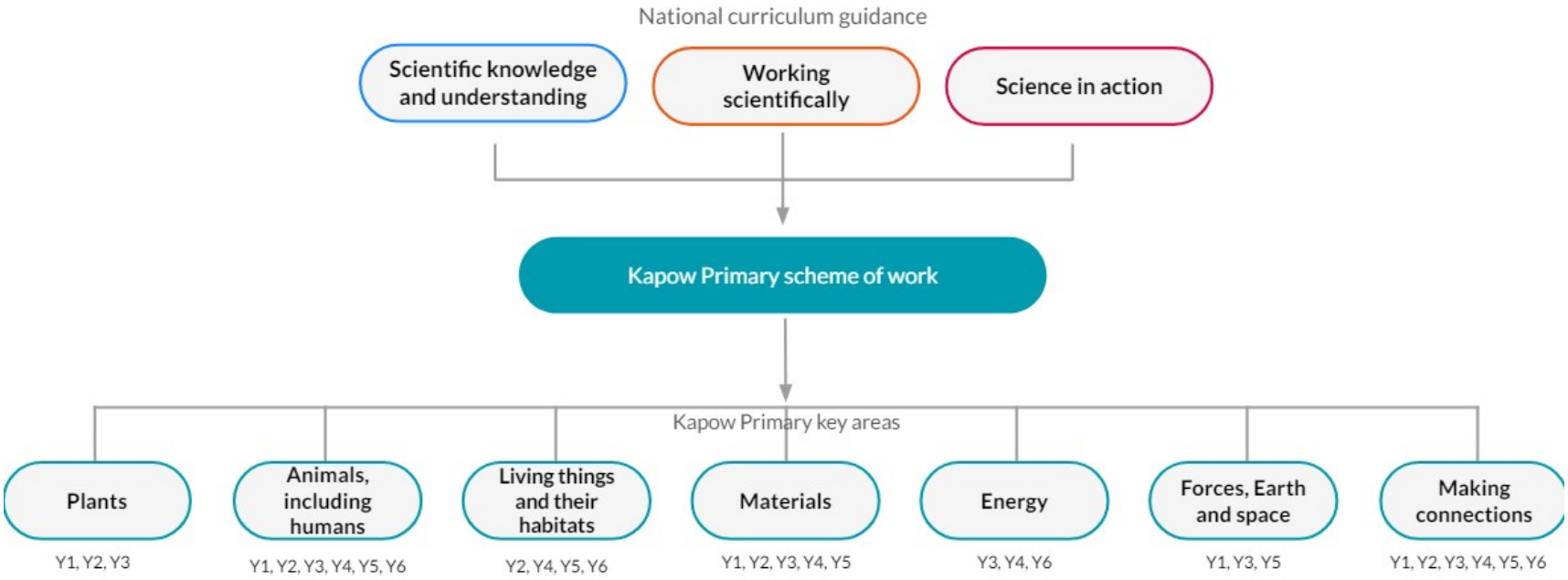
- ★ develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
- ★ develop understanding of the nature, processes and methods of science through different types of scientific enquiries that help them to answer scientific questions about the world around them
- ★ are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

We have identified these strands which run throughout our scheme of work:

- **Scientific knowledge and understanding**
- **Working scientifically**
- **Science in action**

Our National curriculum coverage document shows which of our units cover each of the National curriculum attainment targets as well as each of these strands. Each lesson plan references the relevant national curriculum objectives, along with cross-curricular links to any other subjects.

How is the Science scheme of work organised?



Key areas in Science

Pupils will develop **Scientific knowledge and understanding** in seven key areas. The learning in each area is summarised below:

Animals, including humans

Identifying animals, their basic structure and their eating habits, as well as their basic needs for survival. Children learn about the life cycles of animals and their place in food chains.

Naming parts of the human body and recognising the function of skeletons, muscles, teeth and the digestive and circulatory systems. Learning about the importance of hygiene and of the right type and amount of nutrition. Children learn about the impact of diet, drugs and exercise on the body and study the life cycles of humans.

This key area covers the Year 1, Year 2, Year 3, Year 4, Year 5 and Year 6 subject content titled 'Animals, including humans' from the National curriculum.

Living things and their habitats

Identifying something as living and how it is grouped based on its characteristics, similarities and differences.

Naming different types of habitats, learning what they provide for life and the impact of habitats changing. Children learn about the life cycles and reproduction of animals and plants, and how this affects the variation of living things around us, past and present.

This key area covers the Year 2, Year 4, Year 5 and Year 6 subject content titled 'Living things and their habitats' and 'Evolution and inheritance' from the National curriculum.

Plants

Identifying different plants and their key structures, growing seeds and plants and understanding their requirements for growth. Recognising the function of different plant structures and understanding how plants reproduce.

This key area covers the Year 1, Year 2 and Year 3 subject content titled 'Plants' from the National curriculum.

Materials

Naming materials, describing their properties and understanding why materials have specific uses. Identifying how materials may change and the factors that may contribute to this, including changes of state within the water cycle. Children learn about different mixtures and how they can be separated based on their properties.

Identifying different types of rocks and their physical properties, and understanding how fossils and soil are formed.

This key area covers the Year 1, Year 2, Year 3, Year 4 and Year 5 subject content titled 'Everyday materials', 'Uses of everyday materials', 'Rocks', 'States of matter' and 'Properties and changes of materials' from the National curriculum.

Energy

Learning about light and its properties, how it enables us to see and how shadows are formed. Identifying the relationship between sounds, volume, pitch and vibrations, and how sound travels to the ear.

Recognising electrical appliances and the components that make up different circuits. Building electrical circuits and identifying factors that affect the output.

This key area covers the Year 3, Year 4 and Year 6 subject content titled 'Light', 'Electricity' and 'Sound' from the National curriculum.

Key areas in Science

Pupils will develop **Scientific knowledge and understanding** in seven key areas. The learning in each area is summarised below:

Forces, Earth and space

Identifying changes across the seasons, and the weather and day length associated with each.

Recognising different types of forces and understanding their effect on objects, including the role of pulleys, levers and gears. Children learn about magnetic materials and that magnets attract and repel.

Learning about the movements of planets and moons within the solar system and how this relates to our day and night.

This key area covers the Year 1, Year 3 and Year 5 subject content titled 'Seasonal changes', 'Forces and magnets', 'Earth and space' and 'Forces' from the National curriculum.

Making connections

Finding the optimum: the science subject report (Ofsted, 2023) states that schools should ensure that teachers

'regularly connect new learning to what pupils have already learned. This includes showing pupils how knowledge from different areas of the curriculum connects.'

One of the ways in which we do this is through our Making connections units, which give pupils opportunities, beyond the National curriculum programme of study, to make connections between their science learning.

Different types of knowledge in Science

'Pupils need to develop an extensive and connected knowledge-base. When pupils learn new knowledge it should be integrated with the knowledge they already have. This ensures that learning is meaningful'. (Ofsted research review series: Science, 2021)

Substantive knowledge

Referred to as Scientific knowledge and conceptual understanding in the National curriculum and **Scientific knowledge and understanding** in our scheme of work, this is knowledge of the products of science: concepts, laws, theories and models.

In our *Science: Progression of skills and knowledge* we have broken down the National curriculum attainment targets into knowledge 'chunks' or 'components' and shown how they build over time to develop pupils' understanding of key concepts in Biology, Chemistry and Physics.

Through following our scheme pupils will build their substantive knowledge base by:

- Knowing more facts.
- Giving further examples of the same concept.
- Understanding and using a wider range of vocabulary.
- Using models or concepts that cannot be seen to explain ideas.
- Making and explaining links across areas of science.

Over time, that knowledge will become increasingly organised and connected. The *Recap and recall* section of the lesson helps pupils to activate their prior knowledge and encourages them to make connections between units.

Disciplinary knowledge

Working scientifically specifies the understanding of the nature, processes and methods of science for each year group and is covered alongside our **Scientific knowledge and understanding** strand in each and every unit, never in isolation.

We have broken down the Working scientifically statements from the National curriculum further to ensure gradual progression and focused teaching of the working scientifically skills. This also allows teaching to focus on the component disciplinary knowledge required to enable pupils to carry out the skills competently.

Pupils should be able to see the interplay between the two types of knowledge and our Science in action strand gives pupils this opportunity through seeing how scientists have worked in the past and continue to work in the present day. This furthers pupils' understanding of how some of the substantive knowledge they learn came to be established.

Working scientifically

National curriculum

The National curriculum states that working scientifically should be 'embedded within the content of biology, chemistry and physics' incorporating a range of scientific enquiries that look at the nature, processes and methods of science.

These types of scientific enquiry should include: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources.

Ofsted research review

The review states that there are four main content areas for disciplinary knowledge:

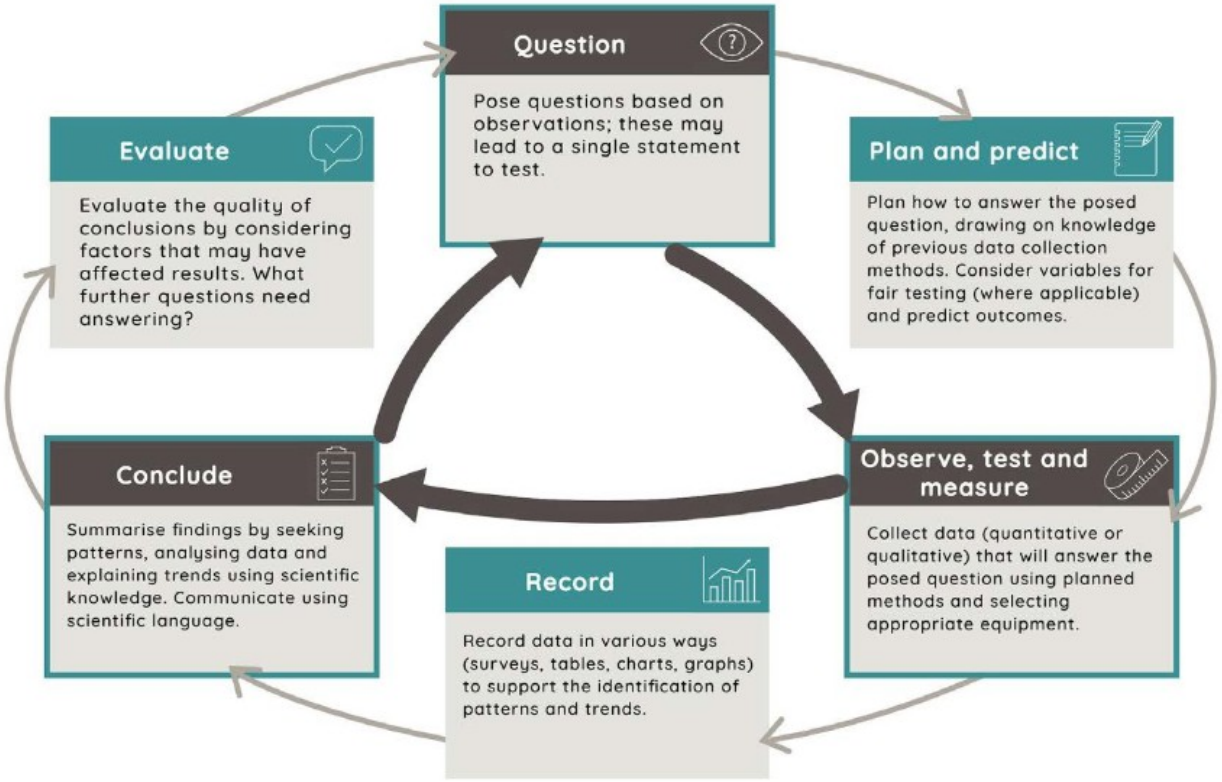
1. **Knowledge of methods that scientists use to answer questions.** use of models, classification, description and the identification of correlations (pattern-seeking) have played important roles, alongside experimentation, in establishing scientific knowledge.
2. **Knowledge of apparatus and techniques, including measurement.**
3. **Knowledge of data analysis.**
4. **Knowledge of how science uses evidence to develop explanations.**

Kapow Primary scheme

Working scientifically forms one of the strands in our curriculum, meaning that it is interwoven into each and every unit alongside scientific knowledge and understanding. We have created a Working scientifically - enquiry cycle which incorporates all the elements of working scientifically mentioned above in an easy-to understand model that also helps pupils to understand the steps involved in a complete scientific enquiry.

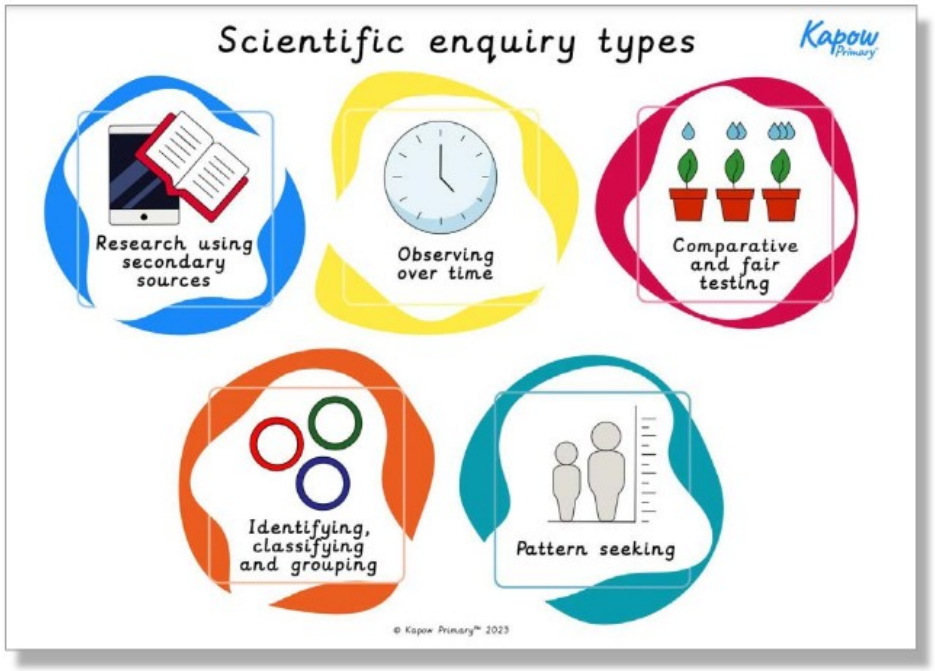
Working scientifically - Enquiry cycle

Kapow Primary has created the working scientifically enquiry cycle below, demonstrating aspirational steps for scientific enquiry. Short enquiry opportunities will focus on a particular working scientifically skill, while ensuring the essential Question - Observe - Conclude cycle is met. Full investigation opportunities will provide an appreciation of how the steps interconnect to form a complete enquiry.



We aim for children to be able to talk confidently about scientific enquiry skills so we have created icons which are visible alongside relevant instructions and activities to help children recognise and become familiar with the stages of the enquiry process.

Working scientifically - Different types of enquiry



The National curriculum states that 'types of scientific enquiry should include: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources' but the Ofsted science subject report notes that 'Overall, in primary schools, inspectors found very few examples of pupils gaining knowledge of pattern seeking or learning about secondary sources.'

The Kapow Primary curriculum aims to familiarise pupils with all these types of enquiry so that by the end of Key stage 2 they are able to choose the most suitable enquiry type to answer questions. In Key stage 1, pupils are introduced to enquiry types as 'Super science skills' and are encouraged to reflect on which skills they have used to answer questions.

Science in action

In addition to working scientifically, the National curriculum also states that pupils should understand the uses and implications of science in the past, present and for the future. References to real-world examples are incorporated into all units, providing the rationale and motivation for why we learn Science. Science in action includes:

Historical applications of Science

- Famous scientists throughout history.
- The methods and equipment used by scientists throughout history and how these have led to modern methods.
- How knowledge and understanding has changed over time, leading to our current understanding of Science.

Careers that use Science

- Broad ranging jobs and careers that use scientific knowledge and methods.
- Scientists of today and their work.
- Science in the news and recent discoveries.
- What Science is attempting to achieve in the future.

The scientific community and beyond

- Science is a dynamic field and is always undergoing changes.
- Mistakes can be the source of new discoveries!
- Collaboration and peer reviewing is essential for effective scientific progress.
- Spiritual, moral, social and cultural links with Science.

Making connections

The Making connections units are an integral part of the Kapow Primary Science scheme, designed around the principle that deep learning occurs when pupils can link new information with existing knowledge. They are the culminating unit in each year group and allow pupils an opportunity to revisit, revise and apply their learning in a new context.

The units integrate and connect scientific concepts and working scientifically skills studied in recent units, as pupils engage in full enquiries and apply the enquiry cycle in new contexts. The emphasis on practical, hands-on lessons and guided enquiries supports the development of independent learning skills and scientific thinking.

'Consolidation of knowledge takes time. The curriculum therefore needs to not just take account of when new component knowledge is introduced, but also ensure that there is sufficient time for this knowledge to be practised and securely remembered in long-term memory.'
(Ofsted research review series: Science, 2021)

Aims of the Making connections units:

- To **revise** key knowledge and skills from units throughout the year, embedding disciplinary knowledge within substantive content.
- To provide further opportunities for **practical, hands-on** learning, engaging pupils in experiments and scientific investigations to apply their knowledge practically and learn how disciplinary knowledge is used across different substantive contexts.
- To foster **teamwork** by encouraging collaboration and communication among pupils, enhancing social skills and cooperative learning.
- To inspire **awe and wonder** in pupils, igniting their curiosity about the natural world and demonstrating the real-life applications and societal significance of scientific theory.
- To promote **outdoor and active** learning by using movement-based activities and outdoor space wherever possible, providing real-world contexts for scientific enquiry and exploration.
- To establish **cross-curricular links**, enhancing pupils' overall educational experience by connecting science learning with other subjects

*These aims align with recommendations from the 'Early Endowment Foundation: Improving Primary Science' (November 2023) and the 'Research Review Series: Science' (April 2021). Both documents highlight the importance of revisiting and consolidating knowledge, practical science activities and the development of scientific enquiry skills.

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 repeatedly during their time in primary school.
- ✓ **Increasing depth**: Each time a skill is revisited it is covered with greater complexity and in varying contexts. Progression includes:
  - studying a specific scientific concept in more detail;
  - studying further examples of a specific concept to broaden contextual knowledge;
  - studying a broader range of equipment and methods to test an hypothesis;
  - explaining concepts using models or ideas that can't be seen;
  - making and explaining links across areas in science;
  - engaging with increasingly complex ideas and ethical dilemmas.
- ✓ **Prior knowledge**: Prior knowledge is utilised so pupils can build upon previous foundations, rather than starting again.

Is there any flexibility in the Kapow Primary Science scheme?

Our Science scheme of work is organised into five core units (six in Year 5) consisting of predominantly six lessons. These ensure that all aspects of the National curriculum are covered.

In addition to this, Kapow offer an additional 'Making connections' unit that explores beyond the statutory curriculum, enabling pupils to revise, apply and extend their learning in innovative ways. These units help pupils to foster a deeper interdisciplinary understanding and appreciation of how scientific principles connect in the real world.

Lessons are planned to be 90 minutes long, reflecting the importance of Science as a core subject in the curriculum. Within each unit, lessons must be taught in order as they build upon one another.

While the National curriculum explains that schools are only required to teach the relevant programme of study by the end of the key stage, we have planned our current Science curriculum with a sequence in mind.

We recommend that the units are taught in the suggested order and year group to maximise progression of knowledge and skills across each key stage. This is because new subject knowledge and working scientifically skills are explicitly taught within certain units and then embedded in later units within the same year group and key stage.

We look forward to sharing a separate, mixed age curriculum in the future.

Other useful documentation:

There are a number of key documents that can support you in planning and delivery of the Kapow Primary **Science** scheme. Visit the Subject planning page for more.

- ✓ National curriculum coverage
  - Shows which of the National curriculum attainment targets are covered by each unit.
- ✓ Progression of skills and knowledge:
  - Shows how understanding and application of key concepts, skills and knowledge in each of the strands builds year on year.
- ✓ Equipment list
  - Explains which resources are required to teach our scheme of work.
- ✓ Knowledge organisers - one per unit:
  - One page overview of the key knowledge and vocabulary from a unit to support pupils' learning.
- ✓ Intent, implementation, impact statement
  - Explains our curriculum design : what is taught and why (Intent), what it looks like in practice (Implementation) and what the outcomes will be (Impact).
- ✓ Assessment spreadsheet
  - A spreadsheet to input teacher assessment data.

Suggested long-term plan: Science - Overview (Key stage 1)

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 1	 Seasonal changes	 Everyday materials	 Sensitive bodies	 Comparing animals	 Introduction to plants	 Investigating science through stories
Year 2	 Habitats	 Microhabitats	 Uses of everyday materials	 Life cycles and health	 Plant growth	 Plant-based materials

Kapow Primary — Suggested long-term plan: Science - Overview (Key stage 2)

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 3	 Movement and nutrition	 Forces and magnets	 Rocks and soil	 Light and shadows	 Plant reproduction	 Does hand span affect grip strength?
Year 4	 Digestion and food	 Electricity and circuits	 States of matter	 Sound and vibrations	 Classification and changing habitats	 How does the flow of liquids compare?
Year 5	 Mixtures and separation	 Properties and changes	 Earth and space	 Life cycles and reproduction	 Unbalanced forces	 Human timeline  Does the size of an asteroid affect its impact strength?
Year 6	 Classifying big and small	 Light and reflection	 Evolution and inheritance	 Circuits, batteries and switches	 Circulation and health	 Are some sunglasses safer than others?

Suggested long-term plan: Science- Outline (Key stage 1)

	Year 1		
Autumn 1	**Forces, Earth and space** Seasonal changes (6 lessons) Reflecting on their own experiences, children learn about the four seasons and the weather associated with each. Pupils explore how seasonal changes affect trees, daylight hours and our choices about outfits. They plan and carry out their own weather reports, considering the knowledge required for this job.	Autumn 2	**Materials** Everyday materials (6 lessons) Identifying the difference between objects and materials, children explore their surroundings to find examples of each. They work scientifically by planning tests, making observations and recording data. Pupils use results to answer questions and sort and group materials based on their properties.
Spring 1	**Animals, including humans** Sensitive bodies (6 lessons) Familiarising themselves with the basic parts of the human body, children investigate their senses through stimulating experiences that highlight how we interact with the world around us. They work scientifically, using their senses to make observations, spot patterns and use data to answer questions. They develop an understanding of how science can support those who have lost sensory function and consider how firefighters use their senses at work.	Spring 2	**Animals, including humans** Comparing animals (6 lessons) Studying both local and global animals, children recognise common characteristics and physical features. They use this information to make comparisons and classify animals. Pupils consider the most effective way to collect data about class pets and record their findings in a block chart. They develop their understanding of classification by comparing the dietary habits of different animals and role play as Jane Goodall carrying out research into chimpanzees in the wild.
Summer 1	**Plants** Introduction to plants (6 lessons) Venturing outside, children identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. They use magnifying glasses to observe and name plant parts and draw and label diagrams of flowers. Children closely observe leaves and sort them into groups based on their appearance. They use non-standard units to measure leaf length and record their observations in a table. Pupils investigate if beans need water for growth and identify edible plant parts.	Summer 2	**Making connections** **Investigating science through stories (5 lessons)** Using picture books and hands-on outdoor activities, children broaden their understanding of plants and animals. They gather and record data to find out if taller trees have larger trunks and recap the features of different animal groups. They identify animals by closely observing footprints and construct waterproof animal homes with natural materials. Pupils sort birds according to their diet and seek patterns in their physical characteristics.

Suggested long-term plan: Science- Outline (Key stage 1)

	Year 2		
Autumn 1	Living things and their habitats Habitats (6 lessons) Considering the life processes that all living things have in common, pupils classify objects into alive, was once alive or has never been alive. Pupils explore global habitats, naming plants and animals that can be found there. They learn how a range of different living things depend on each other for food or shelter. Pupils explore this further by creating food chains to show the sequence that living things eat each other for energy to grow and stay healthy.	Autumn 2	Living things and their habitats Microhabitats (6 lessons) Developing their understanding of scientific enquiry, pupils learn that scientists use a range of skills to answer questions. They discover that microhabitats provide what minibeasts need to survive and carry out a survey to find out where different minibeasts live in the school grounds. They practise asking scientific questions and follow a method to investigate which conditions woodlice prefer. Pupils explore the job role of a botanist by identifying flowering plants.
Spring 1	Materials Uses of everyday materials (6 lessons) Building on their knowledge of everyday materials and their properties, pupils recognise that materials are suited to specific purposes and explore how actions such as stretching and bending affect the shape of solid objects. They compare the suitability of materials; gather and record data in tables and block graphs and use their results to answer questions. Children learn about the harmful effects of plastic and explore eco-friendly alternatives.	Spring 2	Animals, including humans Life cycles and health (6 lessons) Studying the life cycles of various animals, children learn what animals need to survive and how they change over time. Pupils collect data that allows them to observe changes in their peers, while also developing their ability to take measurements and record data. They consider how scientific knowledge helps people to make healthy choices.
Summer 1	Plants Plant growth (6 lessons) Carrying out comparative tests, pupils identify the conditions required for seed germination and compare these to the survival needs of plants in later growth phases. Pupils use rulers to measure stem growth and record data in a table. They use their results to conclude that plants need water, light and a suitable temperature to grow and stay healthy. Children identify the stages in a plant's life cycle and discover how humans impact plants in the environment.	Summer 2	Making connections Plant-based materials (5 lessons) Identifying ways to reduce, reuse and recycle, children draw on their knowledge of properties to invent creative uses for old objects. They discover some natural materials derived from plants and look at the processes involved in making paper. Using their observational skills, they conduct simple tests to choose the most suitable material for homemade plant pots, venturing outdoors to find natural materials to decorate them.

Suggested long-term plan: Science - Outline (Key stage 2)

	Year 3		
Autumn 1	**Animals, including humans** Movement and nutrition (6 lessons) Studying the human skeleton, children identify key bones and compare them to other animals explaining the role within the body. Pupils explore how changes in muscles result in movement and the implications these discoveries have in the scientific development of prosthetic limbs. They study how energy is used by the body, what constitutes a balanced diet in humans and how research contributes to nutritionist expertise.	Autumn 2	**Forces, Earth and space** Forces and magnets (6 lessons) Investigating the movement of vehicles on different surfaces, children learn about the impact of friction and compare uses and drawbacks. They broaden their experience in writing scientific methods and recording data as they investigate contact and non-contact forces. Pupils explore the properties of different magnets and use this to understand their uses.
Spring 1	**Materials** Rocks and soil (6 lessons) Studying rocks and their properties, children learn how to classify rocks and identify how they were formed. They look at the work of paleontologists to learn about fossil formation and use models to explore how fossils tell us about the past. Pupils investigate the physical properties of rocks and link these to their particular uses. Pupils also explore soil formation, separate soil using a sedimentation jar and test soil drainage.	Spring 2	**Energy** Light and shadows (6 lessons) Identifying examples of light sources, children learn that light is needed to see and how its absence causes darkness. Children investigate reflection and shadow formation, including how different factors affect shadows. They explore how shadows can be used to entertain in the arts and create shadow puppets to recount how different people work or experiment with light.
Summer 1	**Plants** Plant reproduction (6 lessons) Building on their prior knowledge of plant structures, children describe the functions of named parts and use evidence to explain their significance in plant development. Pupils investigate factors that may affect plant growth and how water is transported. They explore how seeds vary and create models to show seed dispersal methods.	Summer 2	**Making connections** Does hand span affect grip strength? (5 lessons) Experimenting, analysing data and drawing conclusions allows children to explore the relationship between hand span and grip strength. They test different gloves to improve grip strength and applying their newfound knowledge to design friction gloves, fostering scientific inquiry and problem-solving skills.

Suggested long-term plan: Science - Outline (Key stage 2)

	Year 4		
Autumn 1	Animals, including humans Digestion and food (6 lessons) Using models, children describe the function of key organs in the digestive system. Pupils identify the types of human teeth to create their own model and investigate factors that impact our dental health. They compare human teeth to other animals' and consider this in the light of prior knowledge about predators, prey and food chains. Children take on the role of a naturalist investigating animal faeces for clues about diet, digestion and dentition.	Autumn 2	Energy Electricity and circuits (6 lessons) Exploring appliances that use electricity in their setting, children learn how to work with electricity safely and build circuits. Pupils investigate electrical conductors and insulators and explore the relationship between the number of bulbs and bulb brightness. Real scenarios and historical discoveries inform children about scientific progression and home safety.
Spring 1	Materials States of matter (6 lessons) Investigating the properties of solids, liquids and gases, children learn about the different states of matter. They explore changes of state using relatable examples and use this to explain changes to water through the water cycle. Pupils investigate the relationship between temperature and rate of evaporation while broadening their experience of working scientifically.	Spring 2	Energy Sound and vibrations (6 lessons) Exploring different ways of producing sounds, children learn about the relationship between vibrations and what they hear. They study dolphins and whales to develop their understanding of how sound travels between objects and investigate the role of insulation to protect our ears. Pupils explore how pitch and volume can be altered and make their own musical instruments to demonstrate these principles.
Summer 1	Living things and their habitats Classification and changing habitats (6 lessons) Identifying different ways to group living things, children make classification keys to explore which grouping methods are most effective. Pupils study ways habitats change over time and understand that humans can have both positive and negative effects on their surroundings. They play the role of conservationists and design conservation pamphlets.	Summer 2	Making connections How does the flow of liquids compare? (5 lessons) Revising the states of matter, children consider methods for measuring how liquids flow differently from each other. They plan and execute an enquiry, considering different ways of representing data to support a conclusion. Revisiting the digestive system, the children explore how the flow of different liquids should be considered when producing different medicines.

Suggested long-term plan: Science - Outline (Key stage 2)

	Year 5		
Autumn 1	**Materials** Mixtures and separation (6 lessons) Pupils explore different types of mixtures and the different methods that can be used to separate them. They dissolve a range of substances, identify different solutions and investigate how temperature affects the time taken to dissolve. They design and create a water filter, sieve soil and evaporate solutions.	**Autumn 2**	**Materials** Properties and changes (6 lessons) Broadening their experience of the properties of materials, children investigate hardness, transparency and conductivity and consider how these properties influence the uses of materials. They explore reversible changes, including dissolving and changes of state. Children compare these to irreversible changes, including rusting, burning and mixing vinegar and bicarbonate of soda.
Spring 1	**Forces, Earth and space** Earth and space (6 lessons) Exploring some of the key celestial bodies in our Solar System, children learn their names and compare their movements. Pupils discover the relationship between the Earth's rotation and daylight, making models to represent their knowledge. They make their own sundials and consider how and why humans' ideas about the universe have changed over time.	**Spring 2**	**Living things and their habitats** Life cycles and reproduction (6 lessons) Studying animal life cycles, children learn about the significance of reproduction for a species' survival. Pupils compare asexual and sexual reproduction in plants and grow cuttings to measure and plot root growth over time. Children compare the life cycles of mammals, birds, amphibians and insects identifying key differences. They analyse secondary data to investigate how the amphibian life cycle is affected by predators and climate change.
Summer 1	**Forces, Earth and space** Unbalanced forces (6 lessons) Building on their knowledge of forces, children explore gravity, air resistance and water resistance in more depth and consider the effect of these forces being unbalanced. They demonstrate key principles in the classroom and plan investigations to further their understanding of the effects of these forces. Pupils test their ideas using models and compete to build the most effective pulley system.	**Summer 2**	**Animals, including humans** Human timeline (3 lessons) Studying human development and changes, children identify key stages and consider what data may help determine if a child is growing normally. They describe how puberty affects girls and boys and produce graphs to compare how gestation periods vary across different mammals, including humans. **Making connections** Does the size of an asteroid affect the size of its impact crater? (3 lessons) Experimenting, analysing data and drawing conclusions to explore the relationship between the size of model asteroids and the size of the impact crater they create. They apply their understanding of gravity, air resistance and the Earth and space to make predictions and plan and carry out an enquiry.

Suggested long-term plan: Science - Outline (Key stage 2)

	Year 6		
Autumn 1	Living things and their habitats Classifying big and small (6 lessons) Children broaden their knowledge of how vertebrates, invertebrates, plants and micro-organisms are grouped using shared characteristics. They discover how Carl Linnaeus developed the Linnaean and binomial systems for classifying and naming living things. Pupils use and produce classification keys to sort and identify organisms.	Autumn 2	Energy Light and reflection (6 lessons) Proving that light travels in a straight line, children use this information to explain observations of reflection and shadows. They explore how our eyes allow us to see and how mirrors can be used in a variety of ways. Pupils investigate factors affecting the size of shadows and the laws of reflection. Children apply what they have learned about light by exploring real-life uses of mirrors.
Spring 1	Living things and their habitats Evolution and inheritance (6 lessons) Studying patterns in humans and other species, children learn about characteristics that are inherited from parents and those that are environmental. Through the eyes of Darwin and Wallace, pupils understand how observations lead to theories and explore natural selection. By modelling the variation and natural selection of Darwin's finches, they begin to explain how species evolve over time and the role of fossil evidence that supports this theory.	Spring 2	Energy Circuits, batteries and switches (6 lessons) Using their prior knowledge of electrical circuits, children learn to draw conventional circuit diagrams and use models to explain current, resistance and voltage. They compare different batteries and consider the effect on bulb brightness. Pupils apply their knowledge of switches and electrical circuits to design and produce their own practical devices.
Summer 1	Animals, including humans Circulation and health (6 lessons) Studying the human circulatory system, children learn about the role of the heart, blood and blood vessels and use models to demonstrate their function. They explore how lifestyle choices affect our health and use secondary sources to advise patients. Pupils devise their own investigation to look at the relationship between exercise and heart rate, applying their knowledge of variables and then analysing secondary data to understand fitness better.	Summer 2	Making connections Are some sunglasses safer than others? (5 lessons) Exploring sun safety, children investigate the efficacy of different sunglasses. They devise enquiries to test light and UV transmission of the lenses to form a conclusion about which sunglasses are best, applying their knowledge of electrical circuits to provide a light source in the experiment. The children summarise their findings through presentations and advertisements.

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