Ogbourne CE Primary School
Science Curriculum

Excalibur Academies Trust's Intent

To build a continuum of learning from EYFS (Early Years Foundation Stage) to post A-Level. Through an aspirational, inclusive curriculum, our children will learn to become innovative, curious scientists. They will be challenged to think about the implications of science today and in the future, as responsible global citizens.

Ogbourne CE Primary School's Intent

Why do we teach this? Why do we teach it the way we do?

At Ogbourne CE Primary School, our curriculum intent for science reflects the purpose and aims of the National Curriculum by helping our children to develop scientific knowledge and conceptual understanding through the specific disciplines of Biology, Chemistry and Physics, as well as Earth Sciences. It is our intent to develop children's understanding of the nature, processes and methods of science through different types of scientific enquiries that help them to answer questions about the world around them.

Guided by our school vision, ***'from small streams, big rivers flow'*****,** we recognise that small moments of curiosity and discovery can grow into deep understanding and a lifelong interest in science. Through nurturing inquisitive, resilient learners, we empower children to see that their ideas and investigations can develop over time into meaningful scientific thinking.

Our curriculum aims to develop children' scientific knowledge required to understand the uses and implications of science, today and for the future. We aim to provide children with a body of substantive scientific knowledge as well as knowledge of the

disciplinary concepts in science, enabling them to test theories and answer questions via scientific enquiry within the three main themes of planning, doing and reviewing. Our intent is that children will develop a knowledge of different types of scientific enquiry (identification and classification, pattern seeking, observing over time, fair and comparative testing, and research and exploration).

We emphasise the importance of science in every aspect of daily life and our teaching is centred around increasing children' knowledge of our world. In science, knowledge and process are interlinked so children use existing and taught knowledge as well as evidence from their own enquiry to support and embed their learning within a context. It is our intent that children will learn about the science of our own rural location and the wildlife surrounding our village.

We endeavour to adapt the science curriculum to make it accessible to all children, irrespective of ability or background. We recognise that many of our children do not come from scientific backgrounds, and some will have low 'Science Capital' on entry. Through this approach, we ensure that every chance is taken to "broaden what counts" in order to build on their 'Science Capital' and embedding the belief that science knowledge and processes are relevant to them, their families and our community.

<u>How will we ensure that children understand the "Big Ideas" of science?</u>

We will provide children with the framework they need to see where scientific ideas are related and based on shared concepts. The most important subject content is organised through 'The Big Ideas in Science', enabling new knowledge to be organised systematically and ensure a logical progression. Through our curriculum, children will develop their ability to make links with previous learning and a framework within which to embed future learning.

In Early Years, science is encountered in a range of learning areas. At this stage, they develop the vocabulary they need to be able to talk about science and gain experience in doing so. The curiosity and experiences created through this prepares them well to begin KS1. We recognise how important it is that our children develop a bank of knowledge that improves and grows as they move through our school. They need a body of knowledge related to existing scientific understanding but also a body of knowledge related to the scientific discipline. The combination of these two will allow them not only to understand how existing knowledge was obtained but also to understand how future questions can be approached. In turn they will have a framework of prior learning, in which to slot scientific knowledge gained when they reach Key Stage 3.

Implementation

- *What do we teach? What does this look like?*
- Teachers create a positive attitude to science learning within their classrooms and 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 is taught weekly as a discrete subject. In most year groups, six topics are taught over the course of the year. The scheme of work is devised by the school's science lead with teachers selecting resources from a range of sources: STEM, Hamilton Trust; the Primary Science Teaching Trust; PLAN, the Teacher Assessment in Primary Science (TAPS) project, Plymouth Science and Explorify.

- Planning is based on our curriculum (see below), building upon the knowledge 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.
- Through our planning, we include 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. This curiosity is celebrated within the classroom. Planning involves teachers creating engaging lessons. Teachers use precise questioning in class to test conceptual knowledge and skills, and assess children regularly to identify gaps in learning, so that all children keep up.
- Teachers demonstrate how to use scientific equipment, and the various 'Working Scientifically' skills in order to embed scientific understanding.
- Linked knowledge organisers enable children to learn and retain the important, useful and powerful vocabulary and knowledge contained within each unit.
- Additional opportunities are provided in science, such as science workshops led by external providers (e.g. Wonderdome – planetarium), science days at Excalibur Academies Trust Secondary School (St. John's), British Science Week, link projects with external companies/ charities such as ARC (Action for River Kennet) and Wiltshire Wildlife Trust and educational visits linked to the science curriculum, such as visits to 'We the Curious' and the Science museum. For exceptionally able,

interested and motivated children, extra enrichment workshops can be accessed at Braeside Education Centre in Devizes. There is also an opportunity for children to participate in an annual STEM science club, as part of our extra-curricular wrap-around care provision.

Impact

What will this look like?

How is the learning assessed?

We use four main approaches to our assessment:

1. Retrieval quizzes are used to embed knowledge and develop links between it. They offer assessment as learning and assessment for learning. Five questions are used to begin each lesson and could come from the current or from any prior topic. They are adapted to reflect any misconceptions arising in the initial task.

2. Precise questioning in class to test conceptual knowledge and skills to identify those children with gaps in learning, so that all children keep up - provides assessment as learning and assessment for learning.

3. Half-termly assessment for learning has two strands:

- Specific scientific enquiry types are assessed each half-term within the context of an applied, practical lesson or series of lessons.

- An end of unit written proof of progress (POP) task assesses the substantive knowledge taught that half term. The way in which children record their understanding varies to allow for differences in learning style and some children may respond verbally to a scribe.

4. Teacher's record attainment on Bromcom which enables the school subject lead and the classes next teacher to access accurate data. This shows whether children are working below, at or above the age-related expectations (ARE). Teacher's record extra notes that may be specific to a given pupil or a common misconception on their planning documents. Future teachers will use this information, as well as the initial tasks they carry out themselves, to decide how best to support students in the next related topic.

How is the teaching monitored?

The subject leader monitors planning to ensure that it matches the medium-term plan; that the knowledge content is covered and that the children are being given the opportunities to develop disciplinary knowledge as well as substantive knowledge. Teaching is monitored through learning walks.

How is the overall impact measured?

The teachers half-termly assessment data is recorded on Bromcom to help the subject leader identify children who are exceeding age-related expectations; those who are still working towards them and those whose progress has changed.

The subject leader carries out lesson observations to identify areas where teachers need more support. This also allows the subject leader to identify children working at greater depth and those needing more support. If needed these are followed up by joint work between subject leader and the teacher to plan the next topic.

As well as providing up to date information and ideas about learning in science and managing the school science resources, the subject leader also models teaching with each teacher's own class, particularly where new initiatives are introduced.

Pupil voice is used to further develop the Science curriculum, through questioning of children' scientific knowledge as well as their views and attitudes to science to support the children's enjoyment of science and to motivate learners. We believe that children at Ogbourne CE Primary School receive a high-quality science education, that provides them with the foundations for understanding the world and a framework for the science they need to know in Key Stage 3.

Big Ideas/ Schema
The Big Ideas of Science are recurring themes that appear throughout the whole curriculum. Each Learning Point that is taught will link to a Big Idea. The 'Big Ideas' focus on the 4 main components of scientific knowledge: Physics, Chemistry, Biology and Earth Science Physics P1: The universe follows unbreakable rules that are all about forces, matter and energy. P2: Forces are different kinds of pushes and pulls that act on all the matter that is in the universe. Matter is all the stuff, or mass, in the universe. P3: Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it. Chemistry C1: All matter (stuff) in the universe is made up of tiny building blocks. C2: The arrangement, movement and type of the building blocks of matter and the forces that hold them together or push them apart explain all the properties of matter (e.g. hot/cold, soft/hard, light/heavy, etc). C3: Matter can change if the arrangement of these building blocks changes. Biology B1: Living things are special collections of matter that make copies of themselves, use energy and grow. B2: Living things on Earth come in a huge variety of different forms that are all related because they all came from the same starting point 4.5 billion years ago.

B3: The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live.

Earth science

E1: The Earth is one of eight planets that orbit the sun.

E2: The Earth is tilted and spins on its axis leading to day and night, the seasons and the climate.

E3: The Earth is made up of several layers, including a relatively thin, rocky surface which is divided into tectonic plates, and the movement of these plates leads to many geologic events (such as earthquakes and volcanoes) and geographical features (such as mountains.)

Key Concepts

Through the science curriculum, children will develop an understanding of the following key concepts. These provide lenses through which to consider the different aspects of science and are revisited through different units as children move through the school.

Biology:

Adaptation
Evolution
Energy
Growth
Genetic Information
Classification
Pollination
Ecosystem

Physics:

Magnetism
Force and Movement
Energy

Chemistry:

Materials
States of Matter

Earth Science:
Universe
Seasons
Climate

Disciplinary Knowledge

Through each unit of science, the following disciplinary knowledge is explored. These can be used across all aspects of a subject to organise the substantive knowledge taught.

- Methods to answer scientific questions.
- Apparatus and techniques, including measurement.
- Analysis, presentation and evaluation of scientific data to draw valid conclusion.
- Development of scientific knowledge over time and its implications.

5 Enquiry Types:

 Pattern-seeking

 Research

 Comparative and Fair Testing

 Observing over time

 Identifying, Classifying and Sorting

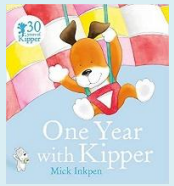
	Methods to answer scientific questions	Apparatus and techniques, including measurement	Analysis, presentation and evaluation of scientific data to draw valid conclusions	Development of scientific knowledge over time and its implications
KS1	Asking simple questions. Identifying and classifying.	Gathering and recording data. Observing closely using simple equipment e.g. hand lens.	Using their observations and ideas to suggest answers to questions.	
Lower KS2	Using different types of scientific enquiries to answer questions. Setting up fair tests, make predictions.	Taking accurate measurements using standard units, use a range of equipment incl. thermometers.	Recording findings using bar charts, keys, tables, labelled diagrams. Draw conclusions. Make predictions for new values, suggest improvements.	Using scientific evidence to support findings.
Upper KS2	Planning different types of scientific enquiries. Recognising and controlling variables.	Taking measurements with increasing accuracy and precision. Taking repeat readings.	Scatter graphs, line graphs, causal relationships. Degree of trust in results.	Identifying scientific evidence used to support or refute ideas or arguments.

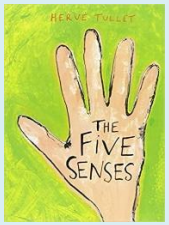
EYFS Curriculum

EYFS Curriculum planning is based on child-initiated and adult led learning, rather than subject specific areas; learning is experiential and holistic. Our curriculum is based on the Statutory Framework for the Early Years Foundation Stage document, Department for Education, 2021, and the supporting guidance: Development Matters in the Early Years Foundation Stage (EYFS), Department for Education, 2020. Children learn to make sense of the world in their own way through play and first-hand experiences. Some aspects of the Key Stage One and Key Stage Two (Y1-Y6) science curriculum have their roots in the EYFS

learning experiences and are reflected in a range of goals across this interconnected curriculum, but most notably in the following areas: ‘Understanding the World’ and ‘Physical Development’.

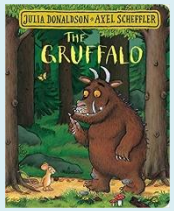
Our KS1 science curriculum is taught termly on a 2-year cycle.

<table>
<tr><th colspan="4">KS1 Science – Year Overview</th></tr>
<tr><td rowspan="5">Term 1
 

 
</td><td colspan="3">Biology: Animals, including humans

Enquiry Question: What are animals like?</td></tr>
<tr><td colspan="2">Prior Learning:
In Early Years children should:
Be able to identify different parts of their body
Have some understanding of healthy food and the need for variety in their diets.
Be able to show care and concern for living things.
Know the effects exercise has on their bodies.
Have some understanding of growth and change.
Can talk about things they have observed including animals</td><td>Future Learning
In Year 2 children will:
Know that animals, including humans, have offspring which grow into adults
Know the basic stages in a life cycle for animals, including humans.
Find out and 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.</td></tr>
<tr><td colspan="3">Vocabulary: sight, hearing, touch, taste, smell, head, neck, ear, mouth, shoulder, hand, fingers, leg, foot, thumb, eye, nose, knee, toes, teeth, elbow</td></tr>
<tr><td colspan="3">Key Scientist:
A scientist like me - Neurobiologist Dr Aarti Sehdev</td></tr>
<tr><td>NC Objectives:</td><td>Substantive ‘Sticky’ Knowledge</td><td>Key Substantive Concepts (linked to the big ideas)</td></tr>
</table>

	Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. Identify and name a variety of common animals that are carnivores, herbivores and omnivores. Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	Know the main body parts and their functions. There are 5 senses that help animals and humans to make sense of the world. There are many different types of animals with different characteristics. Animals have senses to help individuals survive. When animals sense things, they are able to respond.	B3: Evolution
	Key Questions What do animals eat? Do all animals eat the same food? Which of our senses is the most accurate at identifying food? Do all animals hunt?		
	Disciplinary Concepts (Working Scientifically) **Comparative testing:** Is our sense of smell better when we cannot see? 		
	Disciplinary TAPS assessments **Identify and Classify:** Body Parts	**Substantive Knowledge Assessment** Lesson by lesson retrieval quizzes End of unit quiz	

	Classifying animals	
	Maths Sorting animals by type	
Term 2 	**Biology: Living Things and their Habitats** **Enquiry Question: Why do different animals live in different places?**	
	Prior Learning: In Early Years children should: Comment and question about the place they live or the natural world. Shows care and concern for living things and the environment. Can talk about things they have observed such as plants and animals. Notices features of objects in their environment. Comment and ask questions about their familiar world.	**Future Learning** In Year 4 children will: 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. Know and label the features of a river Recognise that environments can change and that this can sometimes pose danger to living things.
	Vocabulary: living, dead, never alive, habitats, micro-habitats, food chain, leaf litter, shelter, seashore, woodland, ocean, rainforest, desert, damp, shade,	
	Key Scientist: Terry Nutkin (TV Presenter), Liz Bonnin (Conservationist)	

NC Objectives:	**Substantive 'Sticky' Knowledge**	**Key Substantive Concepts (linked to the big ideas)**

	Explore and compare the difference 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 the different sources of food.	Some things are living, some were once living but now dead and some things never lived. There is variation between living things. Different animals and plants live in different places. Living things are adapted to survive in different habitats. Environmental change can affect plants and animals that live there.	B1 Evolution
	Key Questions Do all animals eat the same thing? Which animals hunt, and which animals are hunted? Why? What animals live in our school environment? How are animals and plants 'adapted' to live in their habitats How do seasons affect our animals and plants? Which animals hibernate and why? How to habitats change over our school year?		

<table>
<tr><td></td><td colspan="2">Disciplinary Concepts (Working Scientifically)
Research - How are the animals in Australia different to the ones that we find in Britain? How does the habitat of the Arctic compare with the habitat of the rainforest? What ideas did botanist Arthur Tansley have about habitats in 1935?</td></tr>
<tr><td></td><td>Disciplinary TAPS assessments

Gather and record data:

Woodlouse habitat</td><td>Substantive Knowledge Assessment

Lesson by lesson retrieval quiz.
End of unit quiz.</td></tr>
<tr><td></td><td colspan="2">Maths</td></tr>
<tr><td>Term 3

 
</td><td colspan="2">Chemistry: Everyday Materials

Enquiry Question: What are the things I use made from?</td></tr>
<tr><td></td><td>Prior Learning:
In Early Years children should:
Be able to ask questions about the place they live.
Talk about why things happen and how things work.
Discuss the things they have observed such as natural and found objects.
Manipulate materials to achieve a planned effect.</td><td>Future Learning
In Year 2 children will:
Identify and compare the suitability of a variety of everyday materials, including wood metal, plastic, glass, brick, rock, paper and cardboard for particular uses.
Find out how shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</td></tr>
<tr><td></td><td colspan="2">Vocabulary: hard, soft, stretchy, stiff, shiny, dull, rough, smooth, bendy/not bendy, waterproof/not waterproof, absorbent, opaque.</td></tr>
</table>

	Key Scientist: William Addis (Toothbrush Inventor) John McAdam(roads)		
	NC Objectives:	**Substantive 'Sticky' Knowledge**	**Key Substantive Concepts (linked to the big ideas)**
	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.	There are many different materials that have different describable and measurable properties. Materials that have similar properties are grouped into metals, rocks, fabrics, wood, plastic and ceramics (including glass). The properties of a material determine whether they are suitable for a purpose.	C1: Materials
	Key Questions Buildings Which rocks are the least crumbly? Which materials absorb the most water? Which type of brick would be the easiest to drag to make a pyramid? •Which material would be the strongest to use as a floor tile? Toys & Nice things Which fabric would make the softest blanket?		

<table>
<tr><td></td><td colspan="2">The baby has spilt her drink, which material would absorb the drink the best?
We want to make a really slippery slide; which liquid would be best to use?
Which chocolate will melt the fastest on a warm plate (a model of a warm hand)</td></tr>
<tr><td></td><td colspan="2">Disciplinary Concepts (Working Scientifically)
Comparative tests - Which shapes make the strongest paper bridge? Which material would be best for the roof of the little pig’s house?
  </td></tr>
<tr><td></td><td>Disciplinary TAPS assessments

Compare and group:

Floating and sinking
  </td><td>Substantive Knowledge Assessment

Lesson by lesson retrieval quiz.
End of unit quiz.

Venn diagram for grouping</td></tr>
<tr><td></td><td colspan="2">Maths</td></tr>
<tr><td>Term 4</td><td colspan="2">British Science Week

Enquiry Question: Dependent on British Science Week theme; see annual pack</td></tr>
<tr><td></td><td>Prior Learning:</td><td>Future Learning</td></tr>
<tr><td></td><td colspan="2">Vocabulary:</td></tr>
</table>

<table>
<tr><td rowspan="5"></td><td colspan="3">Key Scientist:</td></tr>
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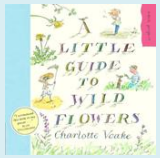
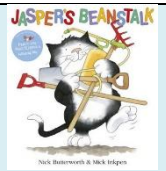
<tr><td colspan="3">Key Questions</td></tr>
<tr><td colspan="3">Disciplinary Concepts (Working Scientifically)</td></tr>
<tr><td></td><td colspan="2">Disciplinary TAPS assessments</td><td>Substantive Knowledge Assessment</td></tr>
<tr><td></td><td colspan="3">Maths</td></tr>
<tr><td rowspan="2">Term 5
 
</td><td colspan="3">Biology: Plants (+ seasonal changes)

Enquiry Question: How many types of plant are there?</td></tr>
<tr><td colspan="2">Prior Learning:
In EYFS children should:
Make observations of plants
Know some names of plants, trees and flowers.
Be able to name and describe different plants, trees and flowers.
Show some care for the world around them.</td><td>Future Learning
In Year 3 Children will:
• Identify and describe the functions of different parts of the flowering plant: roots, stem/trunk/leaves and flowers</td></tr>
</table>

<table>
<tr><td rowspan="5"> 
</td><td colspan="2"></td><td>• Explore the part flowers play in a flowering plant's life cycle, including pollination, seed formation and seed dispersal
• Explain the requirements of plants for life and growth (air, light, water, nutrients from soil, room to grow) and how they vary between plants
• Know the way in which water is transported between plants</td></tr>
<tr><td colspan="3">Vocabulary: leaves, trunk, branch, root, seed, bulb, flower, stem, wild, garden, deciduous, evergreen</td></tr>
<tr><td colspan="3">Key Scientist: Beatrix Potter (Author & Botanist)</td></tr>
<tr><td>NC Objectives:</td><td>Substantive 'Sticky' Knowledge</td><td>NC Objectives:</td></tr>
<tr><td>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.

Identify and name the roots, trunk, branches and leaves of trees.</td><td>Plants grow from seeds/bulbs.

Plants need light, water and warmth to grow and survive.

Flowers make seeds to make more plants (reproduce).

We need plants to survive (to clean air, to eat).

We can eat different parts of the plants (leaves, stems, roots, seeds, fruit).</td><td>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.

Identify and name the roots, trunk,</td></tr>
</table>

<table>
<tr><td></td><td></td><td></td><td>branches and leaves of trees.</td></tr>
<tr><td></td><td colspan="3">Key Questions

How do plants grow?
What do plants need to grow?
Do all plants need water?
Are all plants green?
Why do seeds look different?
Can plants grow as big in the shade?
What is the biggest/smallest/smelliest (etc) tree/flower/plant on the planet?</td></tr>
<tr><td></td><td colspan="3">Disciplinary Concepts (Working Scientifically)
Identify & Classify:
How can we sort the leaves that we collected on our walk?
  </td></tr>
<tr><td></td><td colspan="2">Disciplinary TAPS assessments

Observation over time:

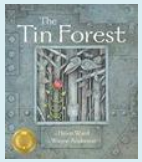
Plant Structure

  </td><td>Substantive Knowledge Assessment

Lesson by lesson retrieval quiz.
End of unit quiz.

Non-chronological report - plants</td></tr>
<tr><td></td><td colspan="3">Maths</td></tr>
</table>

<table>
<tr><td rowspan="6">Term 6

  </td><td colspan="3">Chemistry: Materials

Enquiry Question: Can we change materials? How do we choose the best material?</td></tr>
<tr><td colspan="2">Prior Learning:
In Year 1 children should:
• Distinguish between and object and the material from which it is made.
• Identify and name a variety of everyday materials, including wood, metal, plastic, glass, water and rock.
• Describe the simple physical properties of a variety of everyday materials.
Compare and group together a variety of everyday materials based on their simple properties.</td><td>Future Learning
In Year 3 children will:
• Compare and group together different kinds of rocks based on 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.</td></tr>
<tr><td colspan="3">Vocabulary: waterproof, fabric, rubber, cars, rock, paper, cardboard, wood, metal, plastic, glass, brick, twisting, squashing, bending, matches, cans, spoon</td></tr>
<tr><td colspan="3">Key Scientists: William Addis (Toothbrush Inventor) Charles Mackintosh (Waterproof coat) John McAdam (Roads)</td></tr>
<tr><td>NC Objectives:</td><td>Substantive ‘Sticky’ Knowledge</td><td>Key Substantive Concepts (linked to the big ideas)</td></tr>
<tr><td>Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.

Find out how shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</td><td>`</td><td>C1, C2, C3
Materials</td></tr>
<tr><td colspan="3">Key Questions</td></tr>
</table>

It is recommended that materials be taught three times through KS1. Give a theme for each topic e.g. buildings, exploration, toys, the seaside. Plan to investigate a couple of classes of materials and properties in each topic so children get a depth of experience each topic and cover all the classes of materials over the key stage.

<u>Buildings</u>

• Which rocks are the least crumbly?

• Which materials absorb the most water?

<u>Toys & Nice things</u>

• Which fabric would make the softest blanket?

• The baby has spilt her drink, which material would absorb the drink the best?

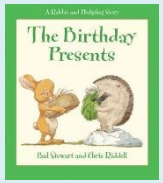
• Which chocolate will melt the fastest on a warm plate (a model of a warm hand)

Disciplinary Concepts (Working Scientifically)
Comparative tests - Which shapes make the strongest paper bridge? Which material would be best for the roof of the little pig's house?

Disciplinary TAPS assessments	**Substantive Knowledge Assessment** Lesson by lesson retrieval quiz.

	Gather and record data: Materials hunt	End of unit quiz.
	Maths	

Our KS1 science curriculum is taught termly on a 2-year cycle.

KS1 Science – Year B Overview		
Term 1	**Earth Science: Seasonal Changes + Chemistry: Materials** **Enquiry Question: What is it like in Autumn and Winter?**	
 	**Prior Learning:** In Early Years children should: • Developing an understanding of change. • Observe and explain why certain things may occur (e.g. leaves falling off trees, weather changes). • Look closely at similarities, differences, patterns and change. • Comments and questions about the place they live or the natural world. • Manipulates materials to achieve a planned effect.	**Future Learning** Year 3 children will: • Recognise that they need 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 their eyes. • Recognise that shadows are formed when the light from a light source is blocked by a solid object. • Find patterns in the way that the sizes of shadows change. In Year 2 children will: • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic,

		glass, brick, rock, paper and cardboard for particular uses. • Find out how shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	
	Vocabulary: Seasons, spring, summer, autumn, winter, windy, sunny, overcast, snow, rain, temperature Hard, soft, stretchy, stiff, shiny, dull, rough, smooth, bendy/not bendy, waterproof/not waterproof, absorbent, opaque,		
	Key Scientist: Holly Green (Meteorologist) Charles Mackintosh (Waterproof coat)		
	NC Objectives:	**Substantive 'Sticky' Knowledge**	**Key Substantive Concepts (linked to the big ideas)**
	Observe changes across the four seasons. Observe and describe weather associated with the seasons and how day length varies. Describe the simple physical properties of a variety of everyday materials. Compare and group together a variety of everyday materials based on their simple properties	Weather can change There are lots of different types of weather: Rain, Sun, Cloud, Wind, Snow, etc Days are shorter and colder in the winter There are four seasons: Spring, Summer, Autumn, Winter There are many different materials that have different describable and measurable properties. Materials that have similar properties are grouped into metals, rocks,	E2 Seasons Climate C1: Materials

		fabrics, wood, plastic and ceramics (including glass). The properties of a material determine whether they are suitable for a purpose.	
	Key Questions Clothing & Materials •Which material could be used to make a waterproof hat for the teacher when she is on the playground at playtime? •Which material could I wrap my ice egg / snowman in to stop it melting, or would it make it melt quicker? •What could I wrap a chicken egg in to keep it warm when it is waiting to hatch? •What could you paint on the runaway gingerbread man that would allow him to swim the river and get away from the fox and not turn to mush?		
	Disciplinary Concepts (Working Scientifically) **Identifying, classifying and grouping:** We need to choose a material to make an umbrella. Which materials are waterproof?		
	Disciplinary TAPS assessments Observe over time - Seasonal Change Ask questions - Waterproof materials	**Substantive Knowledge Assessment** Lesson by lesson retrieval quiz. End of unit quiz. Annotated drawings for seasons	
	Maths		

<table>
<tr><td></td><td colspan="3"></td></tr>
<tr><td>Term 2</td><td colspan="3">Biology: Animals including Humans

Enquiry Question: Do living things change or stay the same?</td></tr>
<tr><td rowspan="5"> 
</td><td colspan="2">Prior Learning:
In Year 1 children should:

Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals.

Identify and name a variety of common animals that are carnivores, herbivores and omnivores.</td><td>Future Learning
In Year 3 children will:
Identify that animals, including humans, need the right types and amount of nutrition, and they cannot make their own food; they get their nutrition from what they eat.
Know how nutrients, water and oxygen are transported within animals and humans.
Know about the importance of a nutritious, balanced diet.
Identify that humans and some other animals have skeletons and muscles for support, protection and movement:</td></tr>
<tr><td colspan="3">Vocabulary: Life cycle, reproduce, reproduction, survival, healthy, nutrients, movement, offspring, maturity, living, non-living, never alive, dead</td></tr>
<tr><td colspan="3">Key:
Steve Irwin (Crocodile Hunter)
Joe Wicks (Personal Trainer)</td></tr>
<tr><td>NC Objectives:</td><td>Substantive ‘Sticky’ Knowledge</td><td>Key Substantive Concepts (linked to the big ideas)</td></tr>
<tr><td>Know that animals, including humans, have offspring which grow into adults.</td><td>Animals move in order to survive.</td><td>B2, B3
Classification</td></tr>
</table>

	Know the basic stages in a life cycle for animals, including humans. Find out and 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.	Different animals move in different ways to help them survive. Exercise keeps animal's bodies in good condition and increases survival chances. All animals eventually die. Animals reproduce new animals when they reach maturity. Animals grow until maturity and then do not grow any larger. Know and understand basic life cycles of different animals (frog/ tadpole, chicks, humans) Animals need food to survive. Animals need a variety of food to help them grow, repair their bodies, be active and stay healthy.	
	Key Questions How long do should my pets live for? Do all animals grow and live the same way? Do bigger animals live longer? Why are we all different heights? How and why do we grow and change?		
	Disciplinary Concepts (Working Scientifically) **Identifying, Classifying and Grouping**: Which offspring belongs to which animal?		

<table>
<tr><td></td><td colspan="2">Observation over time: How does a tadpole change over time?</td></tr>
<tr><td></td><td>Disciplinary TAPS assessments

Identify and Classify:

Living and non-living</td><td>Substantive Knowledge Assessment

Lesson by lesson retrieval quiz.
End of unit quiz.</td></tr>
<tr><td></td><td colspan="2">Maths
Compare and ordering life spans of animals (year 1)
Measuring heights (using m and cm) and comparing/ordering heights (year 2)</td></tr>
<tr><td>Term 3

 
</td><td colspan="2">Physics: Forces

Enquiry Question: How can we change how things move?</td></tr>
<tr><td></td><td>Prior Learning:
In Early Years children should:
know about similarities and differences in relation to places, objects, materials and living things.
talk about the features of their own immediate environment and how environments might vary from one another.
make observations of animals and plants, explain why some things occur, and talk about changes.</td><td>Future Learning
In Year 3 children will:
Compare how things move on different surfaces.
Know how a simple pulley works and use making lifting an object simpler
Notice that some forces need contact between two objects, but magnetic forces can act at a distance.
Observe how magnets attract and repel each other and attract some materials and not others.
Compare and group together a variety of everyday materials based on whether they are attracted to a magnet and identify some magnetic materials.
Describe magnets as having two poles.</td></tr>
</table>

		Predict whether two magnets with attract or repel each other, depending on which poles are facing.	
	Vocabulary: force, push, pull, surface, stop, start, materials, change shape		
	Key Scientist: The Wright Brothers (Aeroplanes) Henry Ford (Cars)		
	NC Objectives:	**Substantive 'Sticky' Knowledge**	**Key Substantive Concepts (linked to the big ideas)**
	There are no specified National Curriculum Objectives for forces at KS1	Pushing and pulling can make things move faster or slower. Pushing and pulling can make things move or stop. Things can move in different ways. Larger masses take bigger pushes and pulls to move or stop them. Pushing and pulling can change the shape of things. Bigger pushes and pulls have bigger effects	P2 Forces
	Key Questions How can we move objects? How can we change the way an object moves? How does a material affect how fast a ball rolls down a slope? How does the length/steepness of a slope affect how far a ball/car/tin will roll off the end?		

<table>
<tr><td></td><td colspan="2">What it a push or a pull that makes it go further?
Which material would be best for a teddy bungee cord?
How does length of an elastic band affect how elastic it is?
Which recipe play dough needs the greatest push to squash it?</td></tr>
<tr><td></td><td colspan="2">Disciplinary Concepts (Working Scientifically)
Pattern Seeking - How does changing the force change the distance a toy car travels?
  </td></tr>
<tr><td></td><td>Disciplinary TAPS assessments

Fair test: Rocket Mice</td><td>Substantive Knowledge Assessment

Lesson by lesson retrieval quiz.
End of unit quiz.</td></tr>
<tr><td></td><td colspan="2">Maths
Measuring, comparing and ordering distances (length) using non-standard units (year 1) and rulers m/cm (year 2)
Presenting data in table or block diagram (year 2)</td></tr>
<tr><td>Term 4</td><td colspan="2">British Science Week

Enquiry Question: Dependent on British Science Week theme; see annual pack</td></tr>
<tr><td></td><td>Prior Learning:</td><td>Future Learning</td></tr>
<tr><td></td><td colspan="2">Vocabulary:</td></tr>
</table>

<table>
<tr><td rowspan="5"></td><td colspan="3">Key Scientist:</td></tr>
<tr><td>NC Objectives:</td><td>Substantive ‘Sticky’ Knowledge</td><td>Key Substantive Concepts (linked to the big ideas)</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="3">Key Questions</td></tr>
<tr><td colspan="3">Disciplinary Concepts (Working Scientifically)</td></tr>
<tr><td></td><td colspan="2">Disciplinary TAPS assessments</td><td>Substantive Knowledge Assessment</td></tr>
<tr><td></td><td colspan="3">Maths</td></tr>
<tr><td rowspan="2">Term 5
 
</td><td colspan="3">Biology: Plants

Enquiry Question: What should I do to grow a healthy plant?</td></tr>
<tr><td colspan="2">Prior Learning:
In Year 1 Children should:
• 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.</td><td>Future Learning
In Year 3 Children will:
• Identify and describe the functions of different parts of the flowering plant: roots, stem/trunk/leaves and flowers</td></tr>
</table>

<table>
<tr><td rowspan="5"> 


</td><td colspan="2">• Identify and name the roots, trunk, branches and leaves of trees.</td><td>• Explore the part flowers play in a flowering plant's life cycle, including pollination, seed formation and seed dispersal
• Explain the requirements of plants for life and growth (air, light, water, nutrients from soil, room to grow) and how they vary between plants
• Know the way in which water is transported between plants</td></tr>
<tr><td colspan="3">Vocabulary: Leaves, trunk, branch, root, seed, bulb, flower, stem, deciduous, evergreen, observe, grow, compare, record, temperature, predict, germinate, warmth, sunlight.</td></tr>
<tr><td colspan="3">Key Scientist: Agnes Arber (Botanist)
Alan Titchmarsh (Botanist & Gardener)</td></tr>
<tr><td>NC Objectives:</td><td>Substantive 'Sticky' Knowledge</td><td>Key Substantive Concepts (linked to the big ideas)</td></tr>
<tr><td>Observe and describe how seeds and bulbs grow into mature plants.

Find out and describe how plants need water, light and warmth to grow and stay healthy</td><td>Plants grow from seeds/bulbs

• Plants need light, water and warmth to grow and survive

• Flowers make seeds to make more plants (reproduce)

• Plants are important

• We need plants to survive (to clean air, to eat)

• We can eat different parts of the plants (leaves, stems, roots, seeds, fruit)</td><td>B1, B2, B3

Growth</td></tr>
</table>

<table>
<tr><td></td><td colspan="2">Key Questions
• Do cress produce seeds, how could we find out?
• Do all plants produce flowers and seeds?
• What is different between freshly cut and planted flowers?
• Do plants flower all year round?
• What are flowers for?
• What happens to a plant after it has produced seeds?</td></tr>
<tr><td></td><td colspan="2">Disciplinary Concepts (Working Scientifically)
Observing over time – Watching changes as bean plant grows
Comparative tests – Does cress grow better inside or outside? In the dark or light?
  </td></tr>
<tr><td></td><td>Disciplinary TAPS assessments

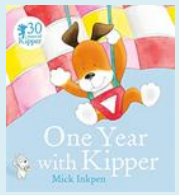
Observe closely: Plant growth

  </td><td>Substantive Knowledge Assessment

Lesson by lesson retrieval quiz.
End of unit quiz.

Non-chronological report - plants</td></tr>
<tr><td></td><td colspan="2">Maths
Measuring, comparing and ordering distances (length) using non-standard units (year 1) and rulers m/cm (year 2)</td></tr>
<tr><td>Term 6</td><td colspan="2">Earth Science: Seasonal Change

Enquiry Question: What is it like in Spring and Summer?</td></tr>
</table>



Prior Learning: In Early Years children should: Developing an understanding of change. Observe and explain why certain things may occur (e.g. leaves falling off trees, weather changes). Look closely at similarities, differences, patterns and change. Comments and questions about the place they live or the natural world.	**Future Learning** In Year 3 children will: Recognise that they need 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 their eyes. Recognise that shadows are formed when the light from a light source is blocked by a solid object. Find patterns in the way that the sizes of shadows change.
Vocabulary: seasons, spring, summer, autumn, winter, windy, sunny, overcast, snow, rain, temperature	
Key Scientist: Dr Steve Lyons (Extreme Weather)	

NC Objectives:	**Substantive 'Sticky' Knowledge**	**Key Substantive Concepts (linked to the big ideas)**
Observe changes across the four seasons Observe and describe weather associated with the seasons and how day length varies.	Weather can change There are lots of different types of weather: rain, sun, cloud, wind, snow, etc Days are longer and hotter in the summer days are shorter and colder in the winter There are four seasons: Spring, Summer, Autumn, Winter	E2 Seasons Climate

Key Questions Why do more frequent days of rain saturate the ground?

<table>
<tr><td></td><td colspan="2">How does rainfall and temperature change over time in our school grounds?
Why do you think leaves turn brown in Winter?
Does this change across the seasons?
What effect does rain have on the environment?
What would happen if there was too much rain?
What would happen if there wasn’t enough rain?</td></tr>
<tr><td></td><td colspan="2">Disciplinary Concepts (Working Scientifically)
Observation over time - How does the colour of a UV bead change over the day?
  </td></tr>
<tr><td></td><td>Disciplinary TAPS assessments

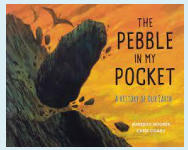
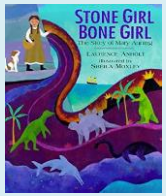
Observe over time and record data:

Seasonal change
  </td><td>Substantive Knowledge Assessment

Lesson by lesson retrieval quiz.
End of unit quiz.</td></tr>
<tr><td></td><td colspan="2">Maths
Use the language of time including telling the time throughout the year, using o’clock and half past (year 1)</td></tr>
</table>

Our LKS2 science curriculum is taught termly on a 2-year cycle.

LKS2 Science – Year A Overview

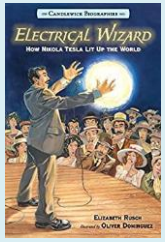
Term 1	**Chemistry: Materials (Rocks)** **Enquiry Question: What are rocks and soils like?**	
  	**Prior Learning:** In Year 2 children should: Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. Find out how shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. Children may: May have some understanding of a variety of different rocks in the natural world. Some understanding of what soil is (how to identify soil etc). May have some knowledge of what a fossil is.	**Future Learning** In Year 4 children will: Compare and group materials together, according to whether they are solids, liquids or gases. Observe that some materials change state when heated or cooled, and measure and research the temperature at which this happens in degrees Celsius. Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. In Year 6 children will: Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.
	Vocabulary: rocks, igneous, metamorphic, sedimentary, permeable, impermeable, fossil, Mary Anning, mould fossil, extinct, base rock.	
	Key Scientist: Mary Anning (Discovery of Fossils) Inge Lehmann (Earth's Mantle)	
	NC Objectives:	**Substantive 'Sticky' Knowledge** / **Key Substantive Concepts**

			(linked to the big ideas)
	Compare and group together different kinds of rocks based on 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	There are different types of rock. There are different types of soil. Soils change over time. Different plants grow in different soils. Fossils tell us what has happened before. Fossils provide evidence. Palaeontologists use fossils to find out about the past. Fossils provide evidence that living things have changed over time	C1, C2 and C3 Materials
	Key Questions How are the soils different? What rock is best for a kitchen chopping board? What might be the issues with various materials and what they must withstand? What types of rocks are there? How can we use composting to make our own soil? How are fossils created? Why do fossils help us find out about historical events?		
	Disciplinary Concepts (Working Scientifically) **Identifying, classifying and sorting** – types of rocks **Comparative and fair testing** – soil permeability		

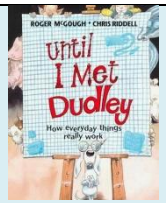
<table>
<tr><td></td><td colspan="2">Research – Mary Anning</td></tr>
<tr><td></td><td>Disciplinary TAPS assessments

Rocks report</td><td>Substantive Knowledge Assessment

Lesson by lesson retrieval quiz.
End of unit quiz.
Non-chronolgical report – types of rocks</td></tr>
<tr><td></td><td colspan="2">Maths
Chose and use appropriate standard units to measure capacity (l/ml) using measuring vessels (year 2)
Interpret and construct block diagrams (year 2) bar charts (year 3) and tables</td></tr>
<tr><td>Term 2

 
</td><td colspan="2">Physics: Electricity

Enquiry Question: What can we do with electricity?</td></tr>
<tr><td></td><td>Prior Learning:
In Early Years children:
May have some understanding that objects need electricity to work.
May understand that a switch will turn something on or off.</td><td>Future Learning
In Year 6 children will:
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.</td></tr>
<tr><td></td><td colspan="2">Vocabulary: electricity, electric current, appliances, mains, crocodile clips, wires, bulb, battery cell, battery holder, motor, buzzer, switch, conductor, electrical insulator, component</td></tr>
<tr><td></td><td colspan="2">Key Scientist:</td></tr>
</table>

<table>
<tr><td rowspan="4"> 
</td><td colspan="3">Thomas Edison (first working lightbulb)
Joseph Swan (indancescent light bulb)</td></tr>
<tr><td>NC Objectives:</td><td>Substantive ‘Sticky’ Knowledge</td><td>Key Substantive Concepts (linked to the big ideas)</td></tr>
<tr><td> 
</td><td>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 a lamp will light in a simple series circuit, based on whether the lamp is part of a complete loop with a battery.

Recognise that a switch opens and closes the circuit and associate this with whether a lamp lights in a simple series circuit. Recognise some common conductors and insulators, and associate metals with being good conductors.

Know the difference between a conductor and an insulator, giving examples of each.

Safety when using electricity.</td><td>A source of electricity (mains of battery) is needed for electrical devices to work.

Electricity sources push electricity round a circuit.

More batteries will push the electricity round the circuit faster.

Devices work harder when more electricity goes through them.

A complete circuit is needed for electricity to flow and devices to work.

Some materials allow electricity to flow easily and these are called conductors. Materials that don’t allow electricity to flow easily are called insulators.</td><td>P1 and P3

Forces and movement

Energy</td></tr>
<tr><td colspan="3">Key Questions:

What would life be like without electricity?
• What sorts of things use/need electricity?</td></tr>
</table>

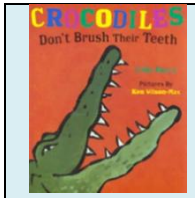
<table>
<tr><td></td><td colspan="2">• What electricity do I use?
• How do we make electricity?
• What materials can carry electricity? (conductors/insulators)</td></tr>
<tr><td></td><td colspan="2">Disciplinary Concepts (Working Scientifically)
Comparative and fair tests – How does the thickness of a conducting material affect how bright the light is? Which metal is the best conductor of electricity?
Research – how has electricity changed the way we live?
  </td></tr>
<tr><td></td><td>Disciplinary TAPS assessments

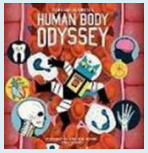
<u>Circuit products</u>

  </td><td>Substance Knowledge Assessment

Lesson by lesson retrieval quiz.
End of unit quiz.</td></tr>
<tr><td></td><td colspan="2">Maths
Use standard units (mm/cm) to measure length/width (year 3)
Interpret and construct tables (year 3)</td></tr>
<tr><td>Term 3</td><td colspan="2">Biology: Digestion and Teeth

Enquiry Question: What do our bodies do with the food we eat?</td></tr>
<tr><td></td><td>Prior Learning:
In Year 3 children should:
Identify that animals, including humans, need the right types and amount of nutrition, and they cannot make their own food; they get their nutrition from what they eat.</td><td>Future Learning
In Year 5 children will:
Know the life cycle of different living things, e.g. mammal, amphibian, insect bird.
Know the differences between different life cycles.</td></tr>
</table>





Know how nutrients, water and oxygen are transported within animals and humans. Know about the importance of a nutritious, balanced diet. Identify that humans and some other animals have skeletons and muscles for support, protection and movement	Know the process of reproduction in plants. Know the process of reproduction in animals	
Vocabulary: herbivore, carnivore, digestive system, tongue, mouth, teeth, oesophagus, stomach, gall bladder, small intestine, pancreas, large intestine, liver, tooth, canine, incisor, molar, premolar, producer, consumer.		
Key Scientist: Ivan Pavlov (Digestive System Mechanisms)		
NC Objectives: Describe the simple functions of the basic parts of the digestive system in humans. Identify the different types of teeth in humans and their simple functions. Construct and interpret a variety of food chains, identifying producers, predators and prey	**Substantive 'Sticky' Knowledge** Animals have teeth to help them eat. Different types of teeth do different jobs. Different types of animals have different teeth to suit the type of food they eat. Food is broken down by the teeth and further in the stomach and intestines where nutrients go into the blood. The blood takes nutrients around the body. Nutrients produced by plants move to primary consumers then to secondary consumers through food chains.	**Key Substantive Concepts (linked to the big ideas)** B1 and B3: Energy Evolution
Key Questions Why do we need a variety of different foods? Do all organisms eat the same things? Why do some people need different diets? (weight lifter vs marathon runner) Why are teeth important?		

<table>
<tr><td></td><td colspan="2">What happens to our food?
What is our digestive system?
How does our food turn into poo and wee?</td></tr>
<tr><td></td><td colspan="2">Disciplinary Concepts (Working Scientifically)
Identifying, classifying, grouping – Types of teeth
Observation over time – eggshells in liquids
  </td></tr>
<tr><td></td><td>Disciplinary TAPS assessments

Observation over time: <u>Teeth in liquid</u>

Research and present findings: <u>Digestion modelling</u>
  </td><td>Substantive Knowledge Assessment

Lesson by lesson retrieval
End of unit quiz

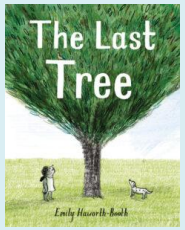
Explanation text - digestion</td></tr>
<tr><td></td><td colspan="2">Maths
Estimate and read time – minutes/seconds (year 3) and compare duration of events (year 3)
Present and interpret data using a table (year 3)</td></tr>
<tr><td>Term 4</td><td colspan="2">British Science Week

Enquiry Question: Dependent on British Science Week theme; see annual pack</td></tr>
</table>

<table>
<tr><td rowspan="7"></td><td colspan="2">Prior Learning:</td><td colspan="2">Future Learning</td></tr>
<tr><td colspan="4">Vocabulary:</td></tr>
<tr><td colspan="4">Key Scientist:</td></tr>
<tr><td colspan="2">NC Objectives:</td><td>Substantive ‘Sticky’ Knowledge</td><td>Key Substantive Concepts (linked to the big ideas)</td></tr>
<tr><td colspan="2"></td><td></td><td></td></tr>
<tr><td colspan="4">Key Questions</td></tr>
<tr><td colspan="4">Disciplinary Concepts (Working Scientifically)</td></tr>
<tr><td colspan="2">Disciplinary TAPS assessments</td><td colspan="2">Substantive Knowledge Assessment</td></tr>
<tr><td>Term 5</td><td colspan="4">Biology: Plants

Enquiry Question: How does water move through a plant?</td></tr>
<tr><td></td><td colspan="2">Prior Learning:
In Year 2 Children should:

Observe and describe how seeds and bulbs grow into mature plants.</td><td colspan="2">Future Learning
In Year 6 Children will:
Recognise that living things have changed over time and that fossils provide information about living things</td></tr>
</table>



Find out and describe how plants need water, light and warmth to grow and stay healthy	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 can lead to evolution.	
Vocabulary: air, light, water, nutrients, soil, support, anchor, reproduction, pollination, dispersal, transportation, flower, energy, growth, seedling, carbon dioxide, oxygen, sugar, material, photosynthesis, chlorophyll		
Key Scientists: Jan Ingenhousz (Photosynthesis) Joseph Banks (Botanist)		
NC Objectives:	**Substantive 'Sticky' Knowledge**	**Key Substantive Concepts (linked to the big ideas)**
Identify and describe the functions of different parts of the flowering plant: roots, stem/trunk/leaves and flowers. Explore the part flowers play in a flowering plants life cycle, including pollination, seed formation and seed dispersal. Explain the requirements of plants for life and growth (air, light, water, nutrients from soil, room to grow) and how they vary between plants. Know the way in which water is transported between plants.	Plants are producers, they make their own food. Their leaves absorb sunlight and carbon dioxide. Plants have roots, which provide support and draw water from the soil. Flowering plants have specific adaptations which help it to carry out pollination, fertilisation and seed production.	B1, B2, B3 Growth Pollination Adaptation

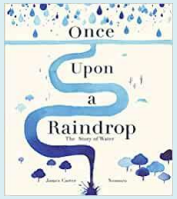
		Seed dispersal improves a plants chances of successful reproduction Seeds/bulbs require the right conditions to germinate and grow. Seeds contain enough food for the plant's initial growth.	
	Key Questions How do plants reproduce? Do all flowers look the same? How do insects know which flowers to pollinate? Why do flowers smell? What do seeds do? Can a plant live without its leaves? Do grass/trees make flowers? What conditions are perfect for a seed to grow? Where do weeds come from? How does the space between seeds affect how well they grow? Does seed size match plant size? Do plants take in water through their roots? How does water move through the plant? How do plants make their food? How does light affect plant growth? How does a plant get carbon dioxide?		
	Disciplinary Concepts (Working Scientifically) Research - What are the different ways seed disperse?		

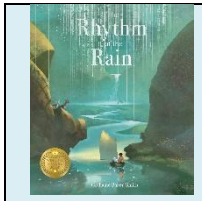
<table>
<tr><td></td><td colspan="2">Observe plants over a period of time</td></tr>
<tr><td></td><td>Disciplinary TAPS assessments

Observe closely using simple equipment:

Fuctions of a plant stem</td><td>Substantive Knowledge Assessment

Lesson by lesson retrieval quiz.
End of unit quiz.</td></tr>
<tr><td></td><td colspan="2">Maths
Compare duration of events (year 2)</td></tr>
<tr><td>Term 6</td><td colspan="2">Chemistry: Materials – Solids, Liquids and Gases

Enquiry Question: Where do ice cubes go when they disappear? Why does it rain and hail?</td></tr>
<tr><td>  </td><td>Prior Learning:
In KS1 children should:
Distinguish between an object and the material from which it is made.
Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.
Describe the simple physical properties of a variety of everyday materials.
Compare and group together a variety of everyday materials based on their simple physical properties.</td><td>Future Learning
In Year 5 children will:
Compare and group together everyday materials based on their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.
Know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution.</td></tr>
</table>

<table>
<tr><td rowspan="5"> 
</td><td colspan="2">Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.
Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</td><td>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 uses of everyday materials, including wood, metals and plastic.
Demonstrate that dissolving, mixing and changes of state are reversible changes.
Explain that some changes result in the formation of new materials, and this kind of change is usually not reversible, including changes associated with burning and the action of acid on bicarbonate of soda.</td></tr>
<tr><td colspan="3">Vocabulary: solid, liquid, gas, particles, state, materials, properties, matter, melt, freeze, water, ice, temperature, process, condensation, evaporation, water vapour, energy, precipitation, collection</td></tr>
<tr><td colspan="3">Key Scientist:
Anders Celsius (Celsius Temperature Scale)
Daniel Fahrenheit (Fahrenheit Temperature Scale / Invention of the Thermometer)</td></tr>
<tr><td>NC Objectives:</td><td>Substantive ‘Sticky’ Knowledge</td><td>Key Substantive Concepts (linked to the big ideas)</td></tr>
<tr><td>Compare and group materials together, according to whether they are solids, liquids or gases.

Observe that some materials change state when heated or cooled, and measure and research the temperature at which this happens in degrees Celsius.</td><td>Solids, liquids and gases are described by observable properties.

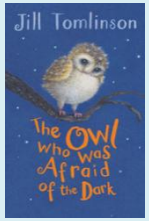
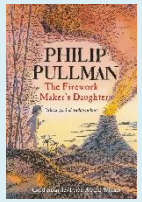
Materials can be divided into solids, liquids and gases.</td><td>C1, C2 and C3

Materials
States of matter</td></tr>
</table>

	Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	Heating causes solids to melt into liquids and liquids evaporate into gases. Cooling causes gases to condense into liquids and liquids to freeze into solids. The temperature at which given substances change state are always the same. Understand the processes in 'The Water Cycle'.	
	Key Questions How does the material sprinkled on ice and snow affect how quickly it melts? What chocolate would be best to smuggle? How does the type of chocolate affect its melting temperature? What is the melting temperature of ice and how does it compare with the freezing temperature of water?		
	Disciplinary Concepts (Working Scientifically) **Identifying, classifying and grouping** – solids, liquids, gases **Comparative/ fair testing** - how does the mass of a block of ice affect how long it takes to melt? 		
	Disciplinary TAPS assessments Making ice-cream	**Substantive Knowledge Assessment** Lesson by lesson retrieval quiz. End of unit quiz. Water Cycle – annotated diagram	
	Maths Measuring temperature using a thermometer (year 2) Present and interpret data using bar charts (year 3)		

	Using negative numbers in the context of temperature (year 4)

Our LKS2 science curriculum is taught termly on a 2-year cycle.

LKS2 Science – Year B Overview		
Term 1	**Physics: Light and Sight** **Enquiry Question:** What is a shadow?	
 	**Prior Learning:** In Year 1 children should have: Observed changes across the four seasons Observed and describe weather associated with the seasons and how day length varies. Children may: have some knowledge of where light comes from. have seen their shadows and may know they appear when it is sunny. have some understanding of a reflection. may understand they need light to be able to see things.	**Future Learning** In Year 6 children will: 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. Know how simple optical instruments work, e.g. periscope, telescope, binoculars, mirror, magnifying glass etc.

	Vocabulary: light source, dark, reflect, ray, mirror, bounce, visible, beam, sun, glare, travel, straight, opaque, shadow, block, transparent, translucent, energy, wave		
	Key Scientist: James Clerk Maxwell (visible and invisible waves of light)		
	NC Objectives:	**Substantive 'Sticky' Knowledge**	**Key Substantive Concepts (linked to the big ideas)**
	Recognise that they need 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 their eyes. Recognise that shadows are formed when the light from a light source is blocked by a solid object. Find patterns in the way that the sizes of shadows change.	There must be light for us to see. Without light it is dark. We need light to see things even shiny things. Transparent materials let light travel through them, and opaque materials don't let light through. Beams of light bounce off some materials (reflection). Shiny materials reflect light beams better than non-shiny materials. Light comes from a source	P1 and P3 Energy
	Key Questions A coin is lost, what would be the best way to find it? (Turn the lights out and see it shine? Use a torch to see it reflect?) How does distance from a light source affect how bright it looks? How does being in darkness affect your sense of hearing? What colour would be the best to make a safety jacket from?		

<table>
<tr><td></td><td colspan="2">How does the colour of a material affect how reflective it is?
What would be the best material to make a blind for a baby's room?
How does thickness of a material affect how much light can pass through it?
How many pieces of tracing paper are as translucent as a single piece of white paper?
How does the shape of a mirror affect how the light reflects?
How can we change the darkness, size and shape of a shadow?</td></tr>
<tr><td></td><td colspan="2">Disciplinary Concepts (Working Scientifically)
Comparative/ fair testing – How does the distance between the shadow puppet and the screen affect the size of the shadow?
Identifying, classifying and grouping – Light sources: natural and artificial
  </td></tr>
<tr><td></td><td>Disciplinary TAPS assessments

Gather and record data to answer questions:

Make shadows</td><td>Substantive Knowledge Assessment

Lesson by lesson retrieval quiz.
End of unit quiz.</td></tr>
<tr><td></td><td colspan="2">Maths
Chose and use appropriate standard units to measure length (m/cm) (year 2)
Present and interpret data using a table (year 3)</td></tr>
<tr><td>Term 2</td><td colspan="2">Biology: Animals including humans

Enquiry Question: Why do animals have skeletons? What is a healthy diet and why is it important?</td></tr>
</table>

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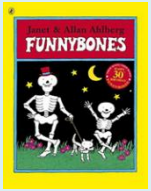
<tr><td rowspan="5"> 
</td><td colspan="2">Prior Learning:
In Year 2 children should:
Know that animals, including humans, have offspring which grow into adults
Know the basic stages in a life cycle for animals, including humans.
Find out and describe the basic needs of animals, including humans, for survival (water, food and air).
Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.</td><td>Future Learning
In Year 4 children will:
Describe the simple functions of the basic parts of the digestive system in humans.
Identify the different types of teeth in humans and their simple functions.
Construct and interpret a variety of food chains, identifying producers, predators and prey</td></tr>
<tr><td colspan="3">Vocabulary: nutrients, nutrition, carbohydrates, protein, fats, vitamins, minerals, water, fibre, skeleton, bones, joints, endoskeleton, exoskeleton, hydrostatic skeleton, vertebrates, invertebrates, muscles, contract, relax</td></tr>
<tr><td colspan="3">Key Scientist:
Adelle Davis (20th Century Nutritionist)
Marie Curie (Radiation / X-Rays)</td></tr>
<tr><td>NC Objectives:</td><td>Substantive ‘Sticky’ Knowledge</td><td>Key Substantive Concepts (linked to the big ideas)</td></tr>
<tr><td>Identify that animals, including humans, need the right types and amount of nutrition, and they cannot make their own food; they get their nutrition from what they eat.

Know how nutrients, water and oxygen are transported within animals and humans.

Know about the importance of a nutritious, balanced diet.</td><td>Different animals are adapted to eat different foods.

Many animals have skeletons to support their bodies and protect vital organs.

Muscles are connected to bones and move them when they contract.

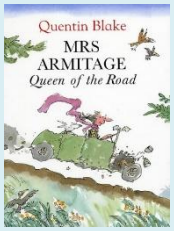
Movable joints connect bones.</td><td>B1, B2 and B3

Adaptation
Evolution
Energy
Classification</td></tr>
</table>

	Identify that humans and some other animals have skeletons and muscles for support, protection and movement:		
	Key Questions Why do we need a skeleton? What types of skeleton are there? Are all skeletons the same? Can something survive without a skeleton? What happens if we break a bone? How do we move? Are bones that are bigger, stronger? Why do we need joints? Why do muscles get tired? Can we 'break' muscles?		
	Disciplinary Concepts (Working Scientifically) **Identifying, classifying and grouping:** How do the skeletons of different animals compare? 		
	Disciplinary TAPS assessments Pattern-seeking: Skeleton questions 		**Substantive Knowledge Assessment** Lesson by lesson retrieval quiz. End of unit quiz.

<table>
<tr><td></td><td colspan="2"></td><td>Explanation text - skeletons</td></tr>
<tr><td></td><td colspan="3">Maths</td></tr>
<tr><td>Term 3

 
</td><td colspan="3">Physics: Forces and Magnetism Y3

Enquiry Question: How can we move magnets?</td></tr>
<tr><td></td><td>Prior Learning:
In Year 2 children:

May have an awareness of how to make things stop and start, using simple pushes and pulls.

They may know about floating and sinking</td><td colspan="2">Future Learning
In Year 5 children will:
Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object and the impact of gravity on our lives.
Identify the effects of air resistance, water resistance and friction, which act between moving surfaces.
Recognise that some mechanisms, including levers, pulleys, and gears, allow a smaller force to have a greater effect.
Describe the movement of the Earth, and other planets, relative to the Sun in the solar system.
Describe the movement of the Moon relative to the Earth.
Describe the Sun, Earth and Moon as approximately spherical bodies.
Describe the idea of the Earth’s rotation to explain day and night and the apparent movement of the sun across the sky.</td></tr>
<tr><td></td><td colspan="3">Vocabulary: force, push, pull, friction, surface, magnet, magnetic, magnetic field, pole, north, south, attract, repel, compass</td></tr>
<tr><td></td><td colspan="3">Key Scientists:
William Gilbert (Theories on Magnetism)
Andre Marie Ampere (Founder of Electro-Magnetism)</td></tr>
</table>

	NC Objectives:	Substantive 'Sticky' Knowledge	Key Substantive Concepts (linked to the big ideas)
	Compare how things move on different surfaces. Know how a simple pulley works and use making lifting an object simpler Notice that some forces need contact between two objects, but magnetic forces can act at a distance. Observe how magnets attract and repel each other and attract some materials and not others. Compare and group together a variety of everyday materials based on whether they are attracted to a magnet and identify some magnetic materials. Describe magnets as having two poles. Predict whether two magnets with attract or repel each other, depending on which poles are facing	Different surfaces create different amounts of friction. The amount of friction created by an object moving over a surface depends on the roughness of the surface and the object, and the force between them. Magnets exert attractive and repulsive forces on each other. Magnets exert non-contact forces, which work through some materials. Magnets exert attractive forces on some materials. Magnet forces are affected by magnet strength, object mass, distance from object and object material.	P1 and P2 Magnetism Force and Movement
	Key Questions • What are magnetic materials? How can we find out? • How far away does a magnet have to be before it attracts a magnetic material? • How far away can the magnetic attraction between two magnets be experiences? • Are bigger magnets stronger?		

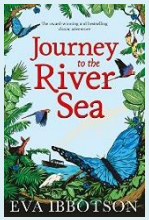
<table>
<tr><td rowspan="3"></td><td colspan="2"></td></tr>
<tr><td colspan="2">Disciplinary Concepts (Working Scientifically)
Identifying, classifying and sorting – magnetic/ not magnetic
Research – how does a compass work?
  </td></tr>
<tr><td>Disciplinary TAPS assessments

Comparative and fair testing: Testing the strength of magnets
  </td><td>Substantive Knowledge Assessment

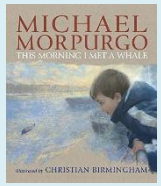
Lesson by lesson retrieval quiz.
End of unit quiz.</td></tr>
<tr><td></td><td colspan="2">Maths
Measuring and comparing length using rulers (year 2)
Presenting and interpreting data in a table (year 2 and 3)</td></tr>
<tr><td rowspan="4">Term 4</td><td colspan="2">British Science Week

Enquiry Question: Dependent on British Science Week theme; see annual pack</td></tr>
<tr><td>Prior Learning:</td><td>Future Learning</td></tr>
<tr><td colspan="2">Vocabulary:</td></tr>
<tr><td colspan="2">Key Scientist:</td></tr>
</table>

<table>
<tr><td></td><td>NC Objectives:</td><td>Substantive ‘Sticky’ Knowledge</td><td>Key Substantive Concepts (linked to the big ideas)</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td colspan="3">Key Questions</td></tr>
<tr><td></td><td colspan="3">Disciplinary Concepts (Working Scientifically)</td></tr>
<tr><td></td><td colspan="2">Disciplinary TAPS assessments</td><td>Substantive Knowledge Assessment</td></tr>
<tr><td>Term 5

 
</td><td colspan="3">Biology: Living Things and their Habitats - Y4

Enquiry Question: Are living things in danger?</td></tr>
<tr><td></td><td colspan="2">Prior Learning:
In Year 2, children should:
Explore and compare the difference 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</td><td>Future Learning
In Year 5:
Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.
Describe the life process of reproduction in some plants and animals.</td></tr>
</table>

<table>
<tr><td rowspan="5"> 
</td><td colspan="2">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 the different sources of food.</td><td></td></tr>
<tr><td colspan="3">Vocabulary: environment, flowering, non-flowering, plants, animals, vertebrates, fish, amphibians, reptiles, mammals, invertebrates, human impact, nature reserves, deforestation</td></tr>
<tr><td colspan="3">Key Scientist:
Cindy Looey (environmental change and extinction)
Jacques Cousteau (Marine biologist)</td></tr>
<tr><td>NC Objectives:</td><td>Substantive ‘Sticky’ Knowledge</td><td>Key Substantive Concepts (linked to the big ideas)</td></tr>
<tr><td>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 danger to living things.</td><td>Living things can be divided into groups based upon their characteristics.

Environmental change affects different habitats differently.

Different organisms are affected differently by environmental change.

Different food chains occur in different habitats.</td><td>B1, B2 and B3:

Classification
Ecosystem
Growth
Evolution
Adaptation</td></tr>
</table>

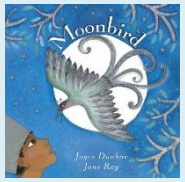
<table>
<tr><td></td><td></td><td>Human activity significantly affects the environment.</td><td></td></tr>
<tr><td></td><td colspan="3">Key Questions
What food chains and webs are there in our local habitat?
How does energy move through the food chain?
How does removal of one species from an environment, affect others? (keystone species)
How does environmental change affect different organisms?
How does human activity affect our environment (ferries on the Solent? Sandown Airport? KFC?)</td></tr>
<tr><td></td><td colspan="3">Disciplinary Concepts (Working Scientifically)
Identifying, classifying and grouping – Insects in local area
Research: Why are people cutting down the rainforests and what effect does that have?
  </td></tr>
<tr><td></td><td colspan="2">Disciplinary TAPS assessments

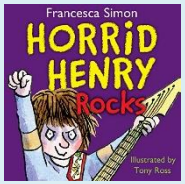
Gather, record and classify data: Local survey

  </td><td>Substantive Knowledge Assessment

Lesson by lesson retrieval quiz.
End of unit quiz.</td></tr>
<tr><td></td><td colspan="3">Maths</td></tr>
<tr><td>Term 6</td><td colspan="3">Physics: Sound

Enquiry Question: How can we make different sounds?</td></tr>
</table>





Prior Learning In KS1 children: May have some understanding that objects make different sounds. Some understanding that they use their ears to hear sounds. Know about their different senses.	**Future Learning** In KS3 children will learn about: Frequencies of sound waves measured in hertz (Hz), echoes, reflection and absorption of sound. Sound needs a medium to travel, the speed of sound in air, in water, in solids. Sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal. Auditory range of humans and animals.

Vocabulary: volume, quiet, loud, ear, pitch, high, low, instruments, wave, vibrations

Key Scientist:
Aristotle (sound waves)
Galileo Galilei (frequency, pitch)
Alexander Graham Bell (phone)

NC Objectives:	**Substantive 'Sticky' Knowledge**	**Key Substantive Concepts (linked to the big ideas)**
Know how sound is made associating some of them with vibrating. Know what happens to a sound as it travels from its source to our ears. Know the correlation between the volume of a sound and the strength of the vibrations that produced it. Know how sound travels from a source to our ears.	Sound travels from its source in all directions and we hear it when it travels to our ears. Sound travel can be blocked. Sound spreads out as it travels. Changing the shape, size and material of an object will change the sound it produces.	P1 and P3 Energy

	Know the correlation between pitch and the object producing a sound.	Sound is produced when an object vibrates. Sound moves through all materials by making them vibrate. Changing the way an object vibrates changes its sound. Bigger vibrations produce louder sounds and smaller vibrations produce quieter sounds. Faster vibrations (higher frequencies) produce higher pitched sounds.	
	Key Questions How can you change the volume of a sound? How does the size of an ear trumpet affect the volume of sound detected? How does the type of material affect how well is blocks a sound? Which materials vibrate better and produce louder sounds? Can we identify any patterns? Which materials make the best string telephone components? (tin cans, paper cups, plastic cups, wire, cable, string, plastic or elastic – predict and test) How does length of the tube (when making a straw oboe) affect the pitch and volume?		
	Disciplinary Concepts (Working Scientifically) **Pattern seeking** - Is there a link between how loud it is in school and the time of day? If there is a pattern, is it the same in every area of the school?  Observation over time: When is our classroom the quietest? 		

	Disciplinary TAPS assessments **String phones** **Comparative and fair testing: Pitch** 	**Substantive Knowledge Assessment** Lesson by lesson retrieval quiz. End of unit quiz.
	Maths Tell and write time to five minutes (year 2)	

Our UKS2 science curriculum is taught termly on a 2-year cycle.

UKS2 Science – Year A Overview		
Term 1	**Chemistry: Materials (Mixture and Separation)** **Enquiry Question:**	
	Prior Learning: In KS1 children should: Distinguish between an object and the material from which it is made. Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.	**Future Learning** Compare and group together everyday materials based on their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. Give reasons based on evidence from comparative and fair tests, for the uses of

<table>
<tr><td rowspan="6"> 
</td><td colspan="2">Describe the simple physical properties of a variety of everyday materials.
Compare and group together a variety of everyday materials based on their simple physical properties.
Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.
Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</td><td>everyday materials, including wood, metals and plastic.
Demonstrate that dissolving, mixing and changes of state are reversible changes.
Explain that some changes result in the formation of new materials, and this kind of change is usually not reversible, including changes associated with burning and the action of acid on bicarbonate of soda</td></tr>
<tr><td colspan="3">Vocabulary: solid, liquid, gas, particles, state, materials, properties, matter, melt, freeze, water, ice, temperature, process, condensation, evaporation, water vapour</td></tr>
<tr><td colspan="3">Key Scientist:
Spencer Silver, Arthur Fry and Alan Amron (Post-It Notes)
Ruth Benerito (Wrinkle-Free Cotton)</td></tr>
<tr><td>NC Objectives:</td><td>Substantive ‘Sticky’ Knowledge</td><td>Key Substantive Concepts (linked to the big ideas)</td></tr>
<tr><td>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

Know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution.

Use knowledge of solids, liquids, and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.</td><td>When two or more substances are mixed and remain present the mixture can be separated.

Some changes can be reversed, and some cannot.

Materials change state by heating and cooling.</td><td>C1, C2, C3
Materials
States of Matter</td></tr>
<tr><td colspan="3">Key Questions
What are mixtures?</td></tr>
</table>

<table>
<tr><td></td><td colspan="2">What does dissolve mean?
Which of the following dissolve in water: sugar, bicarbonate of soda, oil, chocolate, coffees, dark vinegar and wax?
How does the amount of water used affect how much sugar will dissolve in it?
Which sweets dissolve in water?
How can we separate mixtures?
How can we clean our dirty water?</td></tr>
<tr><td></td><td colspan="2">Disciplinary Concepts (Working Scientifically)
Identify, classify and group: Can you identify and classify reactions and changes into reversible and irreversible? Can you describe their groups similarities and differences?

  </td></tr>
<tr><td></td><td>Disciplinary TAPS assessments

Comparative and Fair Testing: <u>Dirty water filter</u>
  </td><td>Substantive Knowledge Assessment

Lesson by lesson retrieval
End of unit quiz</td></tr>
<tr><td></td><td colspan="2">Maths
Use measure (capacity) with appropriate tools and units (ml/l) and converting between different units of measure (year 4)</td></tr>
<tr><td>Term 2</td><td colspan="2">Chemistry: Materials (Changes)

Enquiry Question: How can we change materials reversibly and irreversibly?</td></tr>
<tr><td></td><td>Prior Learning:
In Year 4 children should:</td><td>Future Learning
In KS3 children will learn about:</td></tr>
</table>

	Compare and group materials together, according to whether they are solids, liquids or gases. Observe that some materials change state when heated or cooled, and measure and research the temperature at which this happens in degrees Celsius. Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	the concept of a pure substance mixtures, including dissolving diffusion in terms of the particle model simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography the identification of pure substances
	**Vocabulary:** transparency, conductivity, magnetic, filter, evaporation, dissolving, mixing material, conductor, dissolve, insoluble, chemical, physical, irreversible, solution, reversable, separate, mixture, insulator, transparent, soluble, property, magnetic	
	Key Scientist: Spencer Silver, Arthur Fry and Alan Amron (Post-It Notes) Ruth Benerito (Wrinkle-Free Cotton)	

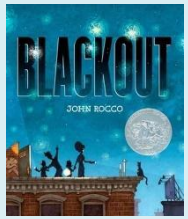
	NC Objectives: Compare and group together everyday materials based on their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. Comparative and fair tests, for the uses of everyday materials, including wood, metals and plastic. Demonstrate that dissolving, mixing and changes of state are reversible changes. Explain that some changes result in the formation of new materials, and this kind of change is usually not reversible, including changes associated with burning and the action of acid on bicarbonate of soda.	**Substantive 'Sticky' Knowledge** All matter (including gas) has mass. Sometimes mixed substances react to make a new substance. These changes are usually irreversible. Heating can sometimes cause materials to change permanently. When this happens, a new substance is made. These changes are not reversible. Indicators that something new has been made are: The properties of the material are different (colour, state, texture, hardness, smell, temperature) If it is not possible to get the material back easily it is likely that it is not there anymore and something new has been made (irreversible change)	**Key Substantive Concepts (linked to the big ideas)** **C1, 2, 3** **Materials/ states of matter**
	Key Questions The key question we want children to interrogate is "have we made a new substance?		

<table>
<tr><td></td><td colspan="2">Wet clay □ air-dried clay □ fired clay.
Flour and water □ dough □ bread
Add sugar to fizzy water; it fizzes up. Has a new substance been made? (No, the gas was dissolved in the water and adding sugar made it become undissolved)
Add baking powder to vinegar, it fizzes up. Has a new substance been made? (Yes, the gas was not in the vinegar as it was not fizzy, so it must have been made)
Add water to instant snow.
Use lemon juice as an invisible ink, heating gently makes the ink visible. Is this a new substance?
When water is added to jelly and it is set, is it a new substance.
When materials are heated or mixed with other materials they sometimes can be made to turn into new materials. The question is how would we know if it was a new material or the same material mixed differently?</td></tr>
<tr><td></td><td colspan="2">Disciplinary Concepts (Working Scientifically)
Research: What are smart materials and how can they help us?
Pattern Seeking - What patterns can you notice in different reactions? How does the amount of bicarbonate of soda, washing up liquid and vinegar affect the reaction?</td></tr>
<tr><td></td><td>Disciplinary TAPS assessments

Comparative and fair testing: Dissolving</td><td>Substantive Knowledge Assessment

Lesson by lesson retrieval quiz.
End of unit quiz.</td></tr>
<tr><td></td><td colspan="2">Maths
Use measure (capacity, weight) with appropriate tools and units (ml/l, g) and converting between different units of measure (year 4)
Interpret and present data using bar charts and time graphs (year 4)</td></tr>
</table>

<table>
<tr><td>Term 3</td><td colspan="3">Physics: Electricity

Enquiry Question: Can we vary the effects of electricity?</td></tr>
<tr><td rowspan="5"> 
</td><td colspan="2">Prior Learning:
In Year 4, children should:
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 a lamp will light in a simple series circuit, based on whether the lamp is part of a complete loop with a battery.
Recognise that a switch opens and closes the circuit and associate this with whether a lamp lights in a simple series circuit. Recognise some common conductors and insulators, and associate metals with being good conductors.
Know the difference between a conductor and an insulator, giving examples of each.
• Safety when using electricity.</td><td>Future Learning
In Key Stage Three children will learn:
Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge
Potential difference measured in volts, battery and bulb ratings, resistance measured in ohms, as the ratio of potential difference (p.d.) to current
Differences in resistance between conducting and insulating components (quantitative).
Separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects.
The idea of electric field, forces acting across the space between objects not in contact.</td></tr>
<tr><td colspan="3">Vocabulary: electricity, electrons, atom, electric current, mains, bulb, battery cell, battery holder, motor, buzzer, switch, conductor, electrical insulator, conductor.</td></tr>
<tr><td colspan="3">Key Scientists:
Alessandro Volta (Electrical Battery)
Nicola Tesla (Alternating Currents)</td></tr>
<tr><td>NC Objectives:</td><td>Substantive ‘Sticky’ Knowledge</td><td>Key Substantive Concepts (linked to the big ideas)</td></tr>
</table>

	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.	Batteries are a store of energy. This energy pushes electricity round the circuit. When the battery's energy is gone it stops pushing. Voltage measures the 'push.' The greater the current flowing through a device the harder it works. Current is how much electricity is flowing round a circuit. When current flows through wires heat is released. The greater the current, the more heat is released.	P3 Energy
	Key Questions Do all batteries push as hard as each other? What is electricity? How does the voltage of a batters affect how much current is pushed? How does number of bulbs affect the brightness of a bulb? Why are wires insulated in plastic? Does length of wire make a difference? What renewable ways can we generate electricity?		
	Disciplinary Concepts (Working Scientifically) Research: How has our understanding of electricity changed over time? 		
	Disciplinary TAPS assessments		**Substantive Knowledge Assessment**

<table>
<tr><td></td><td>Comparative and Fair Testing: Bulb brightness
  </td><td>Lesson by lesson retrieval
End of unit quiz</td></tr>
<tr><td></td><td colspan="2">Maths</td></tr>
<tr><td rowspan="8">Term 4</td><td colspan="2">British Science Week

Enquiry Question: Dependent on British Science Week theme; see annual pack</td></tr>
<tr><td>Prior Learning:</td><td>Future Learning</td></tr>
<tr><td colspan="2">Vocabulary:</td></tr>
<tr><td colspan="2">Key Scientist:</td></tr>
<tr><td>NC Objectives:</td><td>Substantive ‘Sticky’ Knowledge</td><td>Key Substantive Concepts (linked to the big ideas)</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="2">Key Questions</td></tr>
<tr><td colspan="2">Disciplinary Concepts (Working Scientifically)</td></tr>
</table>

<table>
<tr><td></td><td colspan="2"></td></tr>
<tr><td></td><td>Disciplinary TAPS assessments</td><td>Substantive Knowledge Assessment</td></tr>
<tr><td></td><td colspan="2">Maths</td></tr>
<tr><td>Term 5

 
</td><td colspan="2">Biology: Living Things and their Habitats

Enquiry Question: Do plants and animals reproduce in the same way?</td></tr>
<tr><td></td><td>Prior Learning:
In Year 4 children should:
Construct and interpret a variety of food chains, identifying producers, predators and prey
Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other.
Identify and name a variety of plants and animals in their habitats, including micro habitats.</td><td>Future Learning
In Year 6, pupils will:
Classify living things into broad groups according to observable characteristics and based on similarities and differences.
Give reasons for classifying plants and animals based on specific characteristics.</td></tr>
<tr><td></td><td colspan="2">Vocabulary: reproduction, sexual, asexual, pollination, dispersal, reproduction, cell, fertilisation, pollination, male, female, pregnancy, mammal, metamorphosis, amphibian, embryo</td></tr>
<tr><td></td><td colspan="2">Key Scientist:
Jane Goodall (Animal behaviourist)
James Brodie (Botanist)
David Attenborough (Naturalist and Nature Documentary Broadcaster)</td></tr>
</table>

	NC Objectives:	Substantive 'Sticky' Knowledge	Key Substantive Concepts (linked to the big ideas)
	Know the life cycle of different living things, e.g. mammal, amphibian, insect bird. Know the process of reproduction in plants. Know the process of reproduction in animals.	Different animals mature at different rates and live to different ages. Some organisms reproduce sexually where offspring inherit information from both parents. Some organisms reproduce asexually by making a copy of a single parent. Different types of organisms have different lifecycles.	B1, 2, 3 Growth Ecosystem Genetic information
	Key Questions Do plants reproduce in the same ways as us? How can changes in the environment affect living things? What is a lifecycle? How are the lifecycles of different organisms similar or different?		
	Disciplinary Concepts (Working Scientifically) Identify and classify: Compare this collection of animals based on similarities and differences in their lifecycle. 		
	Disciplinary TAPS assessments		**Substantive Knowledge Assessment**

<table>
<tr><td></td><td>Research: <u>Life cycles</u>

  </td><td>Lesson by lesson retrieval quiz.
End of unit quiz.</td></tr>
<tr><td></td><td colspan="2">Maths</td></tr>
<tr><td>Term 6

  </td><td colspan="2">Biology: Classification

Enquiry Question: In what ways can we sort living things?</td></tr>
<tr><td></td><td>Prior Learning:
In Year 4, children should:
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 danger to living things.</td><td>Future Learning
In Key Stage 3 children will learn about:
the dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere •the adaptations of leaves for photosynthesis.
the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops
the importance of plant reproduction through insect pollination in human food security •how organisms affect, and are affected by, their environment, including the accumulation of toxic materials.</td></tr>
<tr><td></td><td colspan="2">Vocabulary: variation, organisms, populations. classification, characteristics, environment, plants, animals, vertebrates, fish, amphibians, reptiles, mammals, invertebrate, bacteria, organism, invertebrates, vertebrates</td></tr>
<tr><td></td><td colspan="2">Key Scientist:
Carl Linnaeus (Identifying, Naming and Classifying Organisms</td></tr>
</table>

	NC Objectives:	Substantive 'Sticky' Knowledge	Key Substantive Concepts (linked to the big ideas)
	Classify living things into broad groups according to observable characteristics and based on similarities and differences. Give reasons for classifying plants and animals based on specific characteristics.	Variation exists within a population (and between offspring of some plants) – NB: this Key Idea is duplicated in Year 6 Evolution and Inheritance. Organisms best suited to their environment are more likely to survive long enough to reproduce. Organisms are best adapted to reproduce are more likely to do so. Organisms reproduce and offspring have similar characteristic patterns. Competition exists for resources and mates.	B1, 2, 3 Classification Evolution
	Key Questions Why do we need to classify living things? How do we classify? What are the difficulties with classification? (penguins, whales, platypus) What happens if animals of different species breed? (hybrids) What happens to house plants outside? Why do animals and plants compete – and what for?		
	Disciplinary Concepts (Working Scientifically) Pattern Seeking: Do all flowers have the same number of petals? Why do we need to classify living things?		

	Disciplinary TAPS assessments **Research:** Invertebrate research	**Substantive Knowledge Assessment** Lesson by lesson retrieval quiz. End of unit quiz.
	Maths Interpret and present data using bar charts (year 4)	

Our UKS2 science curriculum is taught termly on a 2-year cycle.

UKS2 Science – Year B Overview		
Term 1	**Biology: Evolution** **Enquiry Question: What is evolution, how does it happen and how do scientists know?**	
	**Prior Learning:** From Key Stages 1 & 2, children should: Understand there is a variety of life on Earth Know that some animal's differences are important to their survival Know how animals and plants reproduce Know how fossils form over time	**Future Learning** In Key Stage 3 children will learn about: heredity as the process by which genetic information is transmitted from one generation to the next the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation the variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection

		changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material.	
	Vocabulary: Fossils, Adaptation, Evolution, Characteristics, Reproduction, Genetics, Variation, Inherited, Environmental, Mutation, Competition, Survival of the Fittest, Evidence,		
	Key Scientist: Charles Darwin and Alfred Russel Wallace (Theory of Evolution by Natural Selection) Jane Goodall (Chimpanzees)		
	NC Objectives:	**Substantive 'Sticky' Knowledge**	**Key Substantive Concepts (linked to the big ideas)**
	Know about evolution and can explain what it is. Know how fossils can be used to find out about the past. 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- recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago	Life cycles have evolved to help organisms survive to adulthood. Over time the characteristics that are most suited to the environment become increasingly common. NB: The following could be duplicated in Year 6 Living things and their habitats. Organisms best suited to their environment are more likely to survive long enough to reproduce. Organisms are best adapted to reproduce are more likely to do so.	B1, 2, 3 Classification Evolution Genetic Information

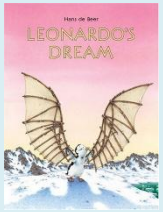
		Organisms reproduce and offspring have similar characteristic patterns. Variation exists within a population (and between offspring of some plants). Competition exists for resources and mates.	

Key Questions
Why are we all different?
What is variation, and why is it important?
What is evolution?
What evidence is there for evolution?
How does evolution happen?
What reasons do animals become extinct?
Polar Bears' habitat is rapidly changing, what possible futures do they face, and can we predict which is most likely?
Why was his theory not initially accepted?

Disciplinary Concepts (Working Scientifically)
Pattern seeking – Is there a pattern between the size and shape of a bird's beak and the food it will eat?
Research - What happened when Charles Darwin visited the Galapagos islands? What ideas did American geneticist Barbara McClintock have about genes that won her a Nobel Prize?

Disciplinary TAPS assessments	**Substantive Knowledge Assessment**
Fossil habitats	Lesson by lesson retrieval quiz. End of unit quiz. Double page spread - evolution

<table>
<tr><td></td><td colspan="3">Maths</td></tr>
<tr><td rowspan="6">Term 2

 
</td><td colspan="3">Physics: Forces

Enquiry Question: How and why do objects move?</td></tr>
<tr><td colspan="2">Prior Learning:
In Year 3 children should:
Compare how things move on different surfaces.
Khow a simple pulley works and use making lifting an object simpler
Notice that some forces need contact between two objects, but magnetic forces can act at a distance.
Observe how magnets attract and repel each other and attract some materials and not others.
Compare and group together a variety of everyday materials based on whether they are attracted to a magnet and identify some magnetic materials.
Describe magnets as having two poles.
Predict whether two magnets with attract or repel each other, depending on which poles are facing.</td><td>Future Learning
In KS3 children will learn about:
opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface
forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only)
change depending on direction of force and its size.</td></tr>
<tr><td colspan="3">Vocabulary: air resistance, water resistance, friction, gravity, Newton, gears, pulleys, force, push, pull, opposing, streamline, brake, mechanism, lever, cog, machine, pulley</td></tr>
<tr><td colspan="3">Key Scientist:
Galileo Galilei (Gravity and Acceleration)
Isaac Newton (Gravitation)
Archimedes of Syracuse (Levers)
John Walker (The Match)</td></tr>
<tr><td>NC Objectives:</td><td>Substantive ‘Sticky’ Knowledge</td><td>Key Substantive Concepts (linked to the big ideas)</td></tr>
</table>

	Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object and the impact of gravity on our lives. Identify the effects of air resistance, water resistance and friction, which act between moving surfaces. Recognise that some mechanisms, including levers, pulleys, and gears, allow a smaller force to have a greater effect.	Air resistance and water resistance are forces against motion caused by objects having to move air and water out of their way. Friction is a force against motion caused by two surfaces rubbing against each other. Some objects require large forces to make them move; gears, pulley and levers can reduce the force needed to make things move	P1, 2 Forces and Movement
	Key Questions What is a force? How can a force act on an object? How can we see forces? How can we measure forces? How does the saltiness (salinity) of water affect the water resistance? How does the length of a piece of a paper helicopter's wings affect the time it takes to fall? How does the changing the shape of a piece of plasticine affect water resistance? How does adding holes to a parachute affect the time it takes to fall? How does the amount/depth of tread affect the friction between a shoe and a surface? How can we use levers to lift heavy objects? What is the most effective way to move an object? How do see-saws work? Can you create a pulley system to life a given load?		
	Disciplinary Concepts (Working Scientifically) **Identify and Classify**: Can you label and name all the forces acting on the objects in each of these situations? Comparative tests - How does the angle of launch affect how far a paper rocket will go?		

<table>
<tr><td></td><td colspan="2">  </td></tr>
<tr><td></td><td>Disciplinary TAPS assessments

Pattern Seeking: Spinners

  </td><td>Substantive Knowledge Assessment

Lesson by lesson retrieval quiz.
End of unit quiz.</td></tr>
<tr><td></td><td colspan="2">Maths
Use measure (length) with appropriate tools and units (mm/cm/m) and converting between different units of measure (year 4)
Measure angles in degrees (year 5)</td></tr>
<tr><td>Term 3

  </td><td colspan="2">Earth Science: Space

Enquiry Question: Sun, Earth & Moon: What is moving and how do we know?</td></tr>
<tr><td></td><td>Prior Learning:
In Key Stage 1 and in Year 3 children should:
Understand changes in weather patterns and seasons.
Compare how things move on different surfaces.
Notice that some forces need contact between two objects, but magnetic forces can act at a distance.
Describe magnets as having two poles. Predict whether two magnets with attract or repel each other, depending on which poles are facing</td><td>Future Learning
In KS3 children will learn about:
Gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only)
Our Sun as a star, other stars in our galaxy, other galaxies
The seasons and the Earth’s tilt, day length at different times of year, in different hemispheres the light year as a unit of astronomical distance</td></tr>
</table>

<table>
<tr><td rowspan="4"> 
</td><td colspan="3">Vocabulary: Earth, Sun, Moon, Axis, Rotation, Day, Night, Phases of the Moon, star, constellation, waxing, waning, crescent, gibbous. Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune, planets, solar system, day, night, rotate, orbit, axis, spherical, geocentric, heliocentric.</td></tr>
<tr><td colspan="3">Key Scientists: Claudius Ptolemy and Nicolaus Copernicus (Heliocentric vs Geocentric Universe) Neil Armstrong (First man on the Moon) Helen Sharman (First British astronaut) Tim Peake (First British ESA astronaut)</td></tr>
<tr><td>NC Objectives:</td><td>Substantive ‘Sticky’ Knowledge</td><td>Key Substantive Concepts (linked to the big ideas)</td></tr>
<tr><td>The movement of the Earth, and other planets, relative to the Sun in the solar system.

Describe the movement of the Moon relative to the Earth.

Describe the Sun, Earth and Moon as approximately spherical bodies.

Describe the idea of the Earth’s

rotation to explain day and night and the apparent movement of the sun across the sky.</td><td>Stars, planets and moons have so much mass they attract other things, including each other due to a force called gravity. Gravity works over distance.

Objects with larger masses exert bigger gravitational forces.

Objects like planets, moons and stars spin.

Smaller mass objects like planets orbit large mass objects like stars.

Stars produce vast amounts of heat and light.

All other objects are lumps of rock, metal or ice and can be seen because they reflect the light of stars.</td><td>E1, E2
Universe</td></tr>
</table>

Key Questions
How does temperature/size/day length/year length change as you get closer/further to the sun?

How does distance from a light source affect how much light hits an object?

Does having more moons result in more light hitting a planet? How could you test this?
How does speed/size of a meteorite affect the size of the moon crater formed?
If the moon became heavier as a result of meteorite collisions what would happen to its position relative to Earth?
If the mass of the Earth is 80x that of the moon, why is the gravity at the Earth's surface only 6x greater than at the surface of the moon?
Why do we have day/night/months/years/seasons?
Why does day length change?
Why does shadow size change over the course of a day?

Disciplinary Concepts (Working Scientifically)
Observation over time - Can you observe and identify all the phases in the cycle of the Moon?

Disciplinary TAPS assessments

Y5/6 Plan Solar System - replicate after modelling.

Phases of the Moon – plan, record on a template the phases of the moon.

Explain in class – in writing / groups – what they see. What does this mean?

Research: Solar system

Substantive Knowledge Assessment

Written assessment on the phases of the moon.

Lesson by lesson retrieval quiz.
End of unit quiz.

	Maths	
Term 4  	**Physics: Light** **Enquiry Question: How do we see?**	
	Prior Learning: In Year 3 children should: Recognise that they need 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 their eyes. Recognise that shadows are formed when the light from a light source is blocked by a solid object. Find patterns in the way that the sizes of shadows change.	**Future Learning** In Key Stage 3, children will learn about: the similarities and differences between light waves and waves in matter light waves travelling through a vacuum; speed of light the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface Science use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative), the human eye light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection.
	Vocabulary: light source, dark, reflect, ray, mirror, bounce, visible, beam, sun, glare, travel, straight, opaque, shadow, block, transparent, translucent, reflect, absorb, emitted, scattered, refraction	
	Key Scientist: Thomas Young (Wave Theory of Light)	

	Ibn al-Haytham (Alhazen) (Light and our Eyes) Percy Shaw (The Cats Eye) A scientist just like Me - Laser Physicist Professor Colin Webb		
	NC Objectives:	**Substantive 'Sticky' Knowledge**	**Key Substantive Concepts (linked to the big ideas)**
	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. Know how simple optical instruments work, e.g. periscope, telescope, binoculars, mirror, magnifying glass etc.	Light is a type of energy. Animals see light sources when light travels from the source into their eyes. Animals see objects when light is reflected off that object and enters their eyes. Light reflects off all objects (unless they are black). Non shiny surfaces scatter the light, so we do not see the beam. Light travels in straight lines.	P1, P2 and P3 Energy
	Key Questions How does the size of an object affect the size of a shadow? How does the distance between the light and the object change the size of a shadow? How does the distance between the object and the size of the screen affect the size of a shadow? How would a solar eclipse be different if: - The moon was a different size? - The earth span faster or slower? - The sun was larger or smaller?		

<table>
<tr><td></td><td colspan="2">- If the earth and moon where the same size but further away in the solar system?

How does the amount of aluminium foil scrunched affect how much light is scatters?
How does the amount of polishing affect how well a piece of metal scatters light?
How perfect are our mirrors? Do some scatter light more than others?
What happens to light when it is shone through water?
How is this affected by putting glitter, salt or talc in the water?
How does a periscope/microscope/telescope work?</td></tr>
<tr><td></td><td colspan="2">Disciplinary Concepts (Working Scientifically)
Comparative Testing: How does the angle that a light ray hits a plane mirror affect the angle at which it reflects off the surface? Which material is most reflective?
Research: Why do some people need to wear glasses to see clearly? How do our eyes adapt to different conditions

  </td></tr>
<tr><td></td><td>Disciplinary TAPS assessments

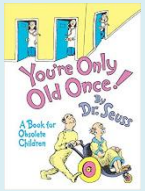
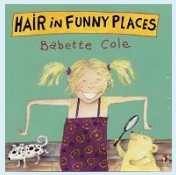
Comparative and Fair Testing: Light questions

Pattern Seeking: Investigating shadows

  </td><td>Substantive Knowledge Assessment

Lesson by lesson retrieval quiz.
End of unit quiz.

Double Page Spread about Light</td></tr>
<tr><td></td><td colspan="2">Maths
Measure angles using a protractor in degrees (year 5)
Construct and interpret information in tables (year 5)</td></tr>
</table>

Term 5	**Biology: Animals including humans** **Enquiry Question: Why and how does the human body change over time?**		
 	**Prior Learning:** In Year 4 children should: Describe the simple functions of the basic parts of the digestive system in humans. Identify the different types of teeth in humans and their simple functions.	**Future Learning** In Year 6: Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. Describe the ways in which nutrients and water are transported within animals, including humans.	
	Vocabulary: foetus, embryo, womb, gestation, baby, toddler, teenager, elderly, growth, development, puberty, hormone, physical, emotional,		
	Key Scientist: Dr Steve Jones (Geneticist) Prof Robert Winston (Human Scientist)		
	NC Objectives:	**Substantive 'Sticky' Knowledge**	**Key Substantive Concepts (linked to the big ideas)**
	Describe the changes as humans develop to old age	Different animals mature at different rates and live to different ages. Puberty is something we all go through, a process which prepares our bodies for being adults, and reproduction Hormones control these changes, which can be physical and/or emotional.	B1 Growth

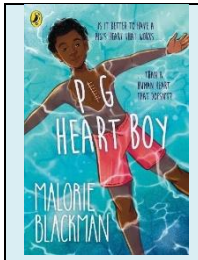
<table>
<tr><td></td><td colspan="2">Key Questions
What do humans look like?
Do all animal embryos look the same?
How do humans change?
Why do humans change?
What causes puberty?
What changes do we go through during puberty?
Are there any patterns between vertebrate animals and their gestation periods?</td></tr>
<tr><td></td><td colspan="2">Disciplinary Concepts (Working Scientifically)
Observation over time: How do different animal embryos change?
  </td></tr>
<tr><td></td><td>Disciplinary TAPS assessments

Pattern Seeking: Growth survey

  </td><td>Substantive Knowledge Assessment

Lesson by lesson retrieval quiz.
End of unit quiz.</td></tr>
<tr><td></td><td colspan="2">Maths</td></tr>
<tr><td>Term 6</td><td colspan="2">Biology: Animals including humans

Enquiry Question: How do our choices affect how our bodies work? Why does my heart beat?</td></tr>
<tr><td></td><td>Prior Learning:
In Year 5 children should:
Describe the changes as humans develop to old age.</td><td>Future Learning
In Key Stage 3 children will learn about:
the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms.</td></tr>
</table>

<table>
<tr><td rowspan="5"> 


</td><td></td><td>the tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts)
calculations of energy requirements in a healthy daily diet
the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases
the structure and functions of the gas exchange system in humans, including adaptations to function
the effects of recreational drugs (including substance misuse) on behaviour, health and life processes.</td></tr>
<tr><td colspan="2">Vocabulary: oxygenated, deoxygenated, valve, exercise, respiration, circulatory system, heart, lungs, blood vessels, blood, artery, vein, pulmonary, alveoli, capillary, digestive, transport, gas exchange, villi, nutrients, water, oxygen, alcohol, drugs, tobacco</td></tr>
<tr><td colspan="2">Key Scientist:
Justus von Liebig (Theories of Nutrition and Metabolism)
Sir Richard Doll (Linking Smoking and Health Problems)
Leonardo Da Vinci (Anatomy)</td></tr>
<tr><td>NC Objectives:</td><td>Substantive ‘Sticky’ Knowledge</td><td>Key Substantive Concepts (linked to the big ideas)</td></tr>
<tr><td>Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.

Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.</td><td>The heart pumps blood around the body.

Oxygen is breathed into the lungs where it is absorbed by the blood.

Muscles need oxygen to release energy from food to do work.</td><td>B1
Energy
Growth</td></tr>
</table>

	Describe the ways in which nutrients and water are transported within animals, including humans.	(Oxygen is taken into the blood in the lungs; the heart pumps the blood through blood vessels to the muscles; the muscles take oxygen and nutrients from the blood.)	
	Key Questions Why do we need oxygen? How do we breathe? Do fish and plants breathe? Do all living things need oxygen? How does the size of a person's lungs affect their lung capacity? Are there ways to increase/decrease our lung capacity? Is lung capacity fixed? Why do we have blood? How does our heart work? How does size of muscle affect our pulse rate? How does exercise effect our pulse rate? How might the circulatory system of an elephant, a hummingbird, or a polar bear differ? Is the air you breathe out, the same as that you breathe in?		
	Disciplinary Concepts (Working Scientifically) Observation over time: How does my heart rate change over the day? 		
	Disciplinary TAPS assessments		**Substantive Knowledge Assessment**

	Comparative and fair testing: Heartrate pose 	Lesson by lesson retrieval quiz. End of unit quiz. Explanation text – heart and lungs
	Maths Record and compare time (minutes/seconds) Construct and interpret line graphs (year 5)	

Progression overview

adaptation, evolution, energy, growth, genetic Information, classification, pollination, ecosystem, magnetism, force and movement, energy, materials, states of matter, universe, seasons, climate

comparative testing,

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Substantive Concepts	adaptation					x	x
	evolution				x	x	x

	energy				x	x	x
	growth	x			x	x	x
	Genetic information					x	x
	classification	x			x	x	x
	pollination				x	x	x
	ecosystem	x			x	x	x
	magnetism				x	x	x
	Force and movement					x	x
	energy	x				x	x
	material	x				x	x
	states of matter					x	x
	universe					x	x
	seasons	x	x			x	x
	climate					x	x

Disciplinary Concepts	Comparative/fair testing 	x	x	x	x	x	x
	Research 	x	x	x	x	x	x
	Observing over time 	x	x	x	x	x	x
	Pattern seeking 	x	x	x	x	x	x
	Identifying, classifying and sorting 	x	x	x	x	x	x