



St Mary's RC Primary School, Sabden Science Long Term Plan KS2 2-year rolling program

Rationale behind KS2 Mixed Age planning (following a 2 year rolling program)

The following 2-year rolling program has been taken from the useful information from the primary-science website (links below) to support the rationale for sequencing units within a mixed-age curriculum map.

- Sequencing learning pgs 6-8 for mixed age classes - <https://www.primary-science.co.uk/product-page/sequencing-science-topics>
- 2-year mixed age rolling prog example curriculum map – particularly useful for KS1 [Sequencing Science Topics Curriculum Map Example - 2-year-group mixed classes | PSEC](#)

NOTE: The rationale for each topic is below each cycle using the documents above. Adding this beneath each cycle ensures it is clear to all teachers (current, new and temporary, such as students and supply). It will help to make it clear why things are taught in a certain order and within a certain cycle. It will avoid teachers changing things around for reasons that are non-beneficial to science learning. It will also act as a reminder when sharing your rationale to all visitors who enquire as to the thinking behind the decision-making process and the sequence of units. This will also support discussions around progression of key learning over time.





St Mary's RC Primary School, Sabden
Science Long Term Plan
KS2 2-year rolling program

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	Y3 Plants (gathering evidence of life cycles)					
Y3/4 Cycle A	Y3 ANIMALS, INCLUDING HUMANS Nutrition (NC Y3) humans get nutrition & energy from the food they eat, food groups from Eatwell Plate.	Y3 ROCKS (NC - Y3) Y3 PLANTS (life cycles – outdoor observations - examples of seed dispersal in everyday life –e.g. trees such as oak/acorn, spinners/sycamore, conkers/horse chestnut)	Y3 ANIMALS, INCLUDING HUMANS Skeletons and movement (NC Y3) Potential to link to a PE/PHSE link to exercise and looking after our bodies.	Y3 FORCES AND MAGNETS Y3 PLANTS (life cycles – outdoor observations - examples of seed dispersal in everyday life e.g. dandelion wind dispersed seeds – Apr/early May)	Y3 PLANTS (parts and their functions and investigating growth)	Y3 LIGHT Y3 PLANTS cont... (life cycles – outdoor observations) (examples of pollination in everyday life –e.g. flowering meadow plants being visited by pollinators – tally charts and pattern-seeking)

Rationale – why we have included these units in this cycle in this order

Other than Animals, including humans (see notes in cycle B) there is no other content in Year 4 that relies on prior knowledge from Year 3. There are, however, topics that are linked within year-groups, as shown below. Therefore, it makes most sense to have the Year 3 topics in one cycle and the Year 4 topics in the other.

PLANTS, ROCKS AND LIGHT

Links can be made between the **PLANTS, ROCKS AND LIGHT** topics from NC Y3. The ordering is not significant, but the links should be made explicit for the children by the teacher. This is the reason that these 3 units have been incorporated into this cycle to help maximise the connections between plants, rocks and light. Soils can be considered in the Rocks unit and Plants Unit. Light from the Sun can be linked to the Light unit (natural light sources) and the Plants unit (requirements for growth and functions of leaves to use sunlight and water to make food/energy for the plant).



St Mary's RC Primary School, Sabden

Science Long Term Plan

KS2 2-year rolling program

Many plants have an annual cycle – having buds, flowers, seeds/berries at certain times in the year. Pupils should therefore visit the same plants throughout the year gathering evidence linked to their life cycle e.g., collecting seeds and taking photographs or making observational drawings for buds, flowers, etc. This evidence can then be reviewed at the end of the year to exemplify a range of plant life cycles. This can be part of an outdoor learning opportunity throughout the year as indicated above (in addition to the main unit theme).

PLANTS

This topic is best taught in the summer term when there is sufficient light in the classroom to grow seedling and plants as part of enquiry work.

PLANTS AUTUMN

- Use classification charts to identify seeds and berries from plants in local habitat(s). Research other parts of that particular life cycle e.g. TREES such as oak (acorn), Sycamore (spinning jenny), horse chestnut (conkers), leaf/blossom/fruit/seed. Also good to research are blackberries, hawthorn berries and/or holly berries which are common in school grounds/ local environments at this time of the year. **WINTER:** Mistletoe is a common Christmas plant with berries (found in florists) that could also be referenced alongside holly plants.

PLANTS SPRING

- Revisit a plant life cycle by focusing on tree blossom. May time - All children could research the life cycle of a dandelion. Can you grow a dandelion from a dandelion seed found in the wild?

PLANTS SUMMER (Half term 1)

- 'Grow a plant' experience linked to observing a complete life cycle 'observing changes' from seed to plant growth to flowering to fruit to seed - For testing 'conditions for plant growth' use **young plants** such as mung beans or sugar snap peas previously grown from seed. These are fast growing and have long shoots suitable to promote more accurate measuring over time. Alternatively, you could use e.g. Rapid-cycling brassicas or tomato plants which work particularly well as their life cycles can be observed within a few weeks. Tomato plants are more common to the children but need slightly more sophisticated gardening skills. Rapid-cycling brassicas can be grown in the classroom, as they are small plants that take up relatively little space. They produce flowers within 2-3 weeks and ripe seeds within 5 weeks. Begin growing these at the beginning of SUM1 to ensure the children have time to observe the growth and a full life cycle.
- Pattern seeking to collect data on how many bees visit meadow flowers in a set period of time.

ANIMALS, INCLUDING HUMANS

This topic can be split into two topics: 1) Nutrition; and 2) Movement (Skeletons and Muscles).



St Mary's RC Primary School, Sabden
Science Long Term Plan
KS2 2-year rolling program

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	Y4 Living things and their habitats (naming and identifying living things in the local environment)					
Y3/4 Cycle B	ANIMALS, INCLUDING HUMANS Teeth and Digestion (NC Y4)	Y4 ELECTRICITY	Y4 MATERIALS STATES OF MATTER		Y4 SOUND	Y4 LIVING THINGS AND THEIR HABITATS

Rationale – why we have included these units in this cycle in this order

Other than 'Animals, Including Humans' (see notes below) there is no other content in Year 4 that relies on prior knowledge from Year 3. There are, however, topics that are linked within year-groups, as shown below. Therefore, it makes most sense to have the Year 3 topics in one cycle and the Year 4 topics in the other.

ANIMALS, INCLUDING HUMANS

If pupils encounter the Year 4 Animals, including humans topic as the first cycle, they would not have the necessary prior knowledge that animals and humans “get nutrition from what they eat” from the Year 3 topic. Consequently, before teaching about the digestive system in the Year 4 Animals, including humans topic, the pupils will need to be taught the idea that animals and humans get the nutrients they require from the food they eat – it is OK to have the Y3 Nutrition Unit in another cycle as long as the above concept is introduced in a basic way to build on.

In cycle B LT&TH, pupils will learn about food chains and that animals get their energy from the food they eat; that energy is transferred through the food chain; that plants are producers and make their own food from water and sunlight in the leaves (photosynthesis) and are always the start of a food chain. Pupils in this cycle may not previously have had the learning from Y3 Plants and the functions of plant parts. They may therefore not be aware that plants are producers because they produce their own energy/'food' in the leaves from sunlight and water. (Plants get *nutrients* from the soil NOT food). Teachers need to be aware of this prior to teaching this unit.

LIVING THINGS AND THEIR HABITATS

In the 'Animals including humans' unit pupils should be taught to construct and interpret a variety of food chains, identifying producers, predators and prey. In order to construct food chains based on their first-hand experience, this statement should be taught after they have visited a habitat to name and identify the plants and animals as part of the Living things and their habitats



St Mary's RC Primary School, Sabden

Science Long Term Plan

KS2 2-year rolling program

topic. Teaching pupils to identify producers, predators and prey represents an opportunity for pupils to apply their knowledge of the function of teeth. Consequently, it makes sense to teach the statement 'construct and interpret a variety of food chains, identifying producers, predators and prey' after learning about teeth within the Animals, including humans topic and within the LT&TH unit.

Animals visible in a habitat will change depending on the weather on the day and the season. In order to build up a full picture of the animals in a habitat, the habitat should be visited at different times throughout the year.

MATERIALS

Y4 States of matter

Needs x2 half term to deliver due to amount of content and practical nature of this unit.

This unit could be split before and after Christmas with Electricity in between to provide time for spaced retrieval if preferred.

SOUND

- In the Sound topic, children need to understand that vibrations from sounds travel through a medium to the ear. It is useful if the children know about the three states of matter – solids, liquids and gases. It is therefore appropriate to teach the States of Matter topic before the Sound topic and both within the same cycle.

MATERIALS

- States of Matter, NC Y4 - There is a lot of content to cover in this topic and therefore more time should be allocated to allow for sufficient coverage.
- States of Matter can be taught as one larger topic across a whole term to allow time to focus on a theme over a longer period OR could be split across 2 half terms with an alternative unit in between which would allow for some spaced retrieval practice. Consider which would be better for the pupils in your setting.
- Properties and Changes of Materials, Y5 - There is a lot of content to cover in this topic and therefore more time should be allocated to allow for sufficient coverage. Schools may choose to separate the content into more than one topic e.g. properties of materials and changes of materials as follows:
SUM1 'Material Properties' focus and introduce 'Material Changes' –
SUM2 'Material Changes'
 - Reversible changes - melting, freezing, evaporation, condensation (revisited from Y4 learning earlier in the cycle), dissolving, rates of (speeding up) dissolving, problem solving separating either rock salt into rock, sand, salt or 'Alien soup' separating paperclips, sand, sugar, Maltesers, rice. Irreversible changes – cooking, burning, chemical changes (e.g. citric acid and vinegar).



St Mary's RC Primary School, Sabden
Science Long Term Plan
KS2 2-year rolling program

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Y5/6 Cycle A	Y6 ANIMALS, INCLUDING HUMANS Y6 Circulatory System	Y5 FORCES	Y5 PROPERTIES OF MATERIALS Y5 Thermal Insulation e.g. TAPS Insulation Layers and Y5 Material Property Testing with a focus on WS skills and independence e.g. TAPS Nappy Absorbency (Y5), TAPS Champion Tape (Y5), TAPS Dunking Biscuits (LKS2), Most absorbent paper towel, Best teabag creation	Y5 ANIMALS, INCLUDING HUMANS Human lifecycles and changes due to puberty (PSHE link) Y6 – Healthy lifestyles – affect of exercise, diet, drugs/tobacco and alcohol on the body	Y6 LIGHT	Y5 EARTH AND SPACE

Rationale – why we have included these units in this cycle in this order

Notes on sequencing the learning in Cycle A

Conceptually more challenging topics are taught later in the year. Where prior knowledge from a previous age phase is required to access the learning in a later topic, these topics are kept in the same cycle. This ensures key concepts within a cycle are progressive, taught in the correct order and children can enter the 2-year rolling program in any cycle.

PROPERTIES AND CHANGES OF MATERIALS

There is no learning interdependency between this topic and any other topic in this phase. However, it is the only Chemistry topic in upper Key Stage 2 and it is a large one. Consequently, it may be worth considering splitting it into two smaller topics, such as 'Properties of Materials' and 'Changes of Materials' as shown below, and put the two topics in different cycles.



St Mary's RC Primary School, Sabden

Science Long Term Plan

KS2 2-year rolling program

Properties of materials (Taught in Cycle A)

- Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.
- Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.

Changes of materials (Taught in Cycle B)

- 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.
- Demonstrate that dissolving, mixing and changes of state are reversible changes.
- Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

Properties of materials (Taught in Cycle A)

Oak Y5 Unit Lesson 1-6 – thermal insulation

1 Properties of materials

I can compare and group together materials based on their simple properties: rigidity, transparency, electric conductivity and magnetism.

2 Uses of everyday materials

I can use test results to explain some uses of everyday materials.

3 Thermal insulators: plan

I can plan to investigate the physical property of thermal insulation.

4 Thermal insulators: do and review

I can carry out a comparative test and explain which cup is most suitable for keeping warm water warm.

5 Everyday uses of thermal insulators

I can identify and name thermal insulators in everyday life.

6 Insulating our homes and schools (non-statutory Climate Change & Sustainability)

I can find out about ways to insulate our homes and schools.



St Mary's RC Primary School, Sabden

Science Long Term Plan

KS2 2-year rolling program

Then... Plan for children to plan and carry out their own investigation from a choice – teacher could select 3 of the below themes to share with the children and groups select their own one to complete.

Testing materials properties - e.g.

- TAPS Nappy Absorbency (Y5),
- TAPS Champion Tape (Y5),
- TAPS Dunking Biscuits (LKS2),
- Most absorbent paper towel,
- Best teabag creation

These investigations would provide opportunities for the UKS2 children to plan more complex fair tests with some independence and choice of what to do and how to carry out their investigations. Children could present their findings and share how they link to a specific material property as an advert or sales pitch for their 'best material'.

ANIMALS, INCLUDING HUMANS

This topic contains important information about puberty which should be delivered when children are in Year 5. This aspect should be taught to the Year 5 pupils as part of Physical Health and Mental Wellbeing, outside of the science two-year cycle for the phase. This should take place before pupils are taught the Year 5 'Animals, including humans' topic. The content in this topic is small and therefore requires less time to cover adequately than other topics.

Y6 ANIMALS, INCLUDING HUMANS

Y6 Circulatory System There is no interdependency between this Y6 unit and the Y5 'Animals Including Humans' unit and so can the Y6 unit can be taught prior to the Y5 unit without any issues linking to progression and prior learning. The Y6 unit can be taught at the beginning of the year but the Y5 unit linked to body change and puberty needs to be taught later in the year to take into account the younger Y5 children within the mixed Y5/6 class.

EARTH AND SPACE / FORCES

If the Forces topic is taught before the Earth and space topic, pupils are able to use their understanding of gravity to help them make sense of why the planets orbit the Sun, and the Moon orbits the Earth.

This topic is conceptually more challenging and is therefore best taught later in the year.

LIGHT

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'GROW A PLANT' OPPORTUNITY

- To ensure a wide variety of plants are experienced and grown throughout KS2 (and to add a biology theme to this cycle of the plan) provide a 'Grow a plant' opportunity in the summer term. Ideally link to an opportunity to explore and observe asexual reproduction such as potato tubers and another e.g. strawberry runners and/or linked to taking cuttings (e.g. mint herb plants). Potential to get a visitor into school who is a gardening expert to teach/model these skills and discuss the learning 'Plants can grow from other methods in addition to seeds'.



St Mary's RC Primary School, Sabden
Science Long Term Plan
KS2 2-year rolling program

Y5/6 Cycle B	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	LIVING THINGS AND HABITATS (NC Y5)	ELECTRICITY (NC Y6)	LIVING THINGS AND HABITATS (NC Y6) Classification	EVOLUTION & INHERITANCE (NC Y6) Including adaptation	PROPERTIES AND CHANGES OF MATERIALS Changes of materials (NC Y5)	

Rationale – why we have included these units in this cycle in this order

Notes on sequencing the learning in Cycle B

Conceptually more challenging topics are taught later in the year. Where prior knowledge from a previous age phase is required to access the learning in a later topic, these topics are kept in the same cycle. This ensures key concepts within a cycle are progressive, taught in the correct order and children can enter the 2-year rolling program in any cycle.

LIVING THINGS IN THEIR HABITATS

If pupils encounter the Year 6 topic as the first cycle, they would not have the necessary prior knowledge from the Year 5 topic to access the learning. Consequently, these two topics should be kept in the same cycle.

EVOLUTION AND INHERITANCE

If pupils encounter the Year 6 Evolution and inheritance topic as the first cycle, they would not have the necessary prior knowledge from the Year 5 'Living things and their habitats' topic to access the learning. Consequently, these two topics should be kept in the same cycle.

PROPERTIES AND CHANGES OF MATERIALS

There is no learning interdependency between this topic and any other topic in this phase. However, it is the only Chemistry topic in upper Key Stage 2 and it is a large one. Consequently, it may be worth considering splitting it into two smaller topics, such as Properties of materials and Changes of materials as shown below, and put the two topics in different cycles.

Properties of materials (Taught in Cycle A)

- Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.
- Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.

Changes of materials (Taught in Cycle B)

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St Mary's RC Primary School, Sabden

Science Long Term Plan

KS2 2-year rolling program

- Demonstrate that dissolving, mixing and changes of state are reversible changes.
- Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

ADDITIONAL ADVICE

The importance of adaptive teaching

As children from two year groups will all be accessing a unit at the same time, adaptive teaching will be required to ensure the younger children (or those requiring more support in the older yr grp) can still access the skills appropriate for their age and stage of learning whilst challenging the older children within the mixed age classes. The skills will be where we can see the progression between yr groups more clearly as the conceptual/substantive knowledge will be THE SAME for the Y3&4 units and then the Y5&6 units.

An example of this is the Materials Unit linked to Thermal Insulation in Cycle A

Thermal Insulation (UKS2, from Y5 unit on Material Properties) - Investigating the best material to insulate a hot drink. The following options could be given to all children.

Give choices to ALL children and model fair testing:

- Test 1: investigate different cups, keep the _____ the same.
- Test 2: investigate a different number of 'insulating' layers around the cup, keep the _____ the same.
- Test 3: investigate the best material for insulating a cup, keep the _____ the same.
- Test 4: investigate if a lid makes a difference, keep the _____ the same.

BUT Y5 given x1 or 2 choice and some guidance (test 2 and 3 most ideal) but Y6 given all choices and a planning board to plan in pairs/threes with less support and scaffolding. ALL children learning about thermal insulation, ALL children focusing on PLANNING an investigation, but the skill and independence is adapted for the different ages. The older children will still require some guidance and scaffolds but reduce the scaffolds more for the older or more able pupils. As a general rule, offer more choices to older/more able children and fewer choices for younger/less able children.

Adding challenge – Teachers may also find the support from Primary-STEM useful to challenge those children who may have grasped an aspect of learning (and where the teacher time is on supporting those who still require some focused support). <https://www.primary-science.co.uk/product-page/challenging-more-able-pupils> . For most children, the units will be new learning building on the previous cycle so all children will be equally new to the substantive knowledge in most cases.



St Mary's RC Primary School, Sabden

Science Long Term Plan

KS2 2-year rolling program

Reviewing and recalling previous learning

It is important that regular opportunities for reviewing and recalling previous learning are incorporated as the children make their way through each year of the rolling program. Some examples might include the following, but this is not an exhaustive list. Be prepared to consider a variety of strategies which promote reviewing, retrieving, and recalling learning.

- 'Big Books' or 'Knowledge organiser' of each unit are created **by the children** as the unit progresses. This can help children to clearly identify what they have learned, summarise it (ideally in their own words along with the scientific vocabulary) and have it available to revisit at a later date. These can be available for children to look at when they revisit a similar area of learning and during other times within the cycle or during a week/unit. Once the children have looked and shared with a partner, challenge them to share a sentence about something (either give them a focus or key vocab word OR keep it open ended).
- Knowledge/concept/vocabulary jars with the key learning in them so these can be dipped into and revisited at random. Definitions are a good way to challenge children to record their understanding of a word through a unit which can then be added to the jar and built up over time.
- The children could make videos of the key learning which can then be posted on the school website to revisit at various times.
- Use of Explorify/lesson warm-ups to regularly recall previous learning and promote talk and discussion about key concepts.
- The use of 'Sticky Learning & Inclusive Practice in Science' strategies. Contact the LPDS Science Consultant rachael.webb@lancashire.gov.uk for training to support this.
- The use of Advanced Organisers ([Expository Method Of Teaching \(David Ausubel\) \(simplypsychology.org\)](#)) contact the LPDS Great Teaching Team for training to support this
- Consider how knowledge and concepts can be revisited through the wider curriculum e.g. Texts used for English units/guided reading.

Effective Monitoring

The key to any good curriculum map is to regularly monitor the impact on pupils' learning. This can be through learning walks, pupil voice interviews, book scrutiny, planning scrutiny and through good team teaching/planning opportunities.

- Can children recall what they have learned – at the end of a lesson and/or the end of a unit? Can they do this at a distance from when the units were taught?
- How is teaching adapted to maximise pupil learning for ALL pupils?
- Is genuine progression evident across KS2?
- Are LKS2 skills embedded, are UKS2 skills evident for older children?
- Are children's misconceptions identified and does learning take account of these to help reduce them?
- Does anything in the rolling program need to be adapted to improve outcomes?
- Is it working?