Latimer Primary School

Science Curriculum

Developing Responsibility; Caring About Achievement

Knowledge Organisers and Assessment Trackers for Science

Science at Latimer

Science at Latimer aims to encourage the children's natural curiosity and create a sense of excitement about the universe. Children are encouraged to ask questions that fuel explorations and investigations and talk about their thoughts relating to events around them.

The learning builds upon Latimer's ethos of **Developing Responsibility; Caring about Achievement** by teaching our children how to take responsibility for their world and to be curious within it.

As children enter in school in EYFS, they develop their curiosity of the universe through their questions and new experiences building on the learning framework provided by Development Matters . Teachers work closely with KS1 colleagues to ensure a smooth transition to year 1 where the learned facts and skills can be built on and yet further developed.

The **'Switched On Science'** scheme of work provides the basis for planning for KS2 teachers. This provides a sound base on which to build an exciting and bespoke series of lessons, with the children always being at the centre of the teachers' minds when planning. KS1 ensure full NC coverage and also design bespoke lessons to ensure that their children are engaged and entertained. The substantive and disciplinary skills are outlined in the science Medium Term Planning for both key stages.

Through their Science experience, our children's scientific minds are developed through investigations where questions are answered, thoughts are vocalised and links between themselves and the world around them are materialised. They are taught the tier 2 and 3 specific science related vocabulary to equip them to verbalise their scientific thoughts- links are made between the scientific vocabulary and the everyday world around them, making science learning intrinsic yet unique to their own world.

Each unit has a Successful Learning Grid that outlines the key substantive and disciplinary knowledge and also the new key vocabulary-with definitions. Children need to be able to ask why something happens and then feel the confidence to investigate phenomena for themselves and discuss this with their peers.

Designing our Science Curriculum

In line with the National Curriculum Programme of Study for KS1 and KS2, our sequences of learning clearly map out the substantive and disciplinary knowledge specific to each year group. The way that we successfully monitor their disciplinary knowledge for each year group is clearly tracked through our Skills Progression Tracker.

The sequence of learning ensures that skills are learned and are then revisited and consolidated over the years to ensure a full and sound grasp. For example, children in year 1 are taught to describe and compare the structure of a variety of common animals, children in year 2 will learn to identify and

compare the suitability of different everyday materials, year 3 learn how to compare and group rocks according to their features. In year 4, children progress to comparing and grouping everyday materials-the ability to compare and group is a core disciplinary skill that is built up over both key stages. All of this involves the very scientific disciplinary knowledge of observation and reporting their findings, using the science-related key vocabulary of course!

Each unit begins with a pre-unit task to aid retrieval for the children and also gives the teacher an idea of any areas that may need consolidation. This is done to ensure that key knowledge and skills are robustly learned and the knowledge is then retained ready to be further developed in the next year group. Children apply their learning through a quality outcome at the end of their learning or a post-assessment quiz.

It is our aim at Latimer to equip our children not only with a scientific and enquiring mind but also with the vocabulary to enable them to talk about their science understanding and the confidence in which to do so. It is our hope that through their science learning, they will then progress to develop into responsible, knowledgeable citizens who aspire to want more and to know more-what more could any school want for their children?

Substantive Knowledge	Disciplinary knowledge
Substantive Knowledge in Science	**The methods to establish the facts**
The facts through the area domains of: - Biology - Chemistry Physics	Working and thinking like scientist by: - Learning through observation - Gathering and collecting data. - Carrying out a range of tests - Predicting, concluding and reporting.

SEND adaptations in Science

At Latimer, we robustly ensure that our Science curriculum is accessible to all. There are a variety of ways that we ensure this and the method we choose very much depends on each lesson and happens at the planning stage. Firstly, we consider how can we present new learning in a way that all children can access. We need to ensure understanding of previously learned concepts, then we can identify the next steps and the size of these steps; do we need to further break them down to ensure that no-one is left behind? Complex ideas made into small manageable steps is key to ensure learning for all.

Other considerations could include using objects, models or images to engage and maintain attention and interest, if there is an additional adult, how can they best be utilised to ensure learning is achievable for all? We consider any sensory impairments and think about the impact on learning that this could have.

Regular consultations with the SEND lead is also vital in ensuring success for all.

Spiritual, Moral, Social & Cultural (SMSC) Development in Science

Spiritual

- Science, at Latimer, promotes the search for meaning and purpose in natural and physical phenomena.
- It stimulates the emotional drive to know more and to wonder more about the world.
- It develops an appreciation of the scale of space and the beauty of the natural world, which in turn leads to a sense of duty to look after the environment by developing an understanding of the negative effects that we could potentially have on it.

Moral

- Through Science units, we teach the wonder of objects around us. It is with this wonder that children naturally proceed to develop a sense of caring for their environment.
- Throughout the Science units, there are multiple ways in which the children's moral development grows, for example; year 1 children learn about a variety of animals and this leads them to understand that animals need respect and to be admired. Year 2 children learn about the importance of recycling and the impact that this has on the environment. Year 4 learn about how environments can change and pose dangers to living things.

Social

- Children in Science frequently work collaboratively. This is such an important skill and is transferrable to so many areas in their day-to-day lives.
- We learn to take turns when we speak, to appreciate and respect the opinions of others.
- We develop the courage to 'have at go' and tell people their ideas and predictions even if they vary from those of others.

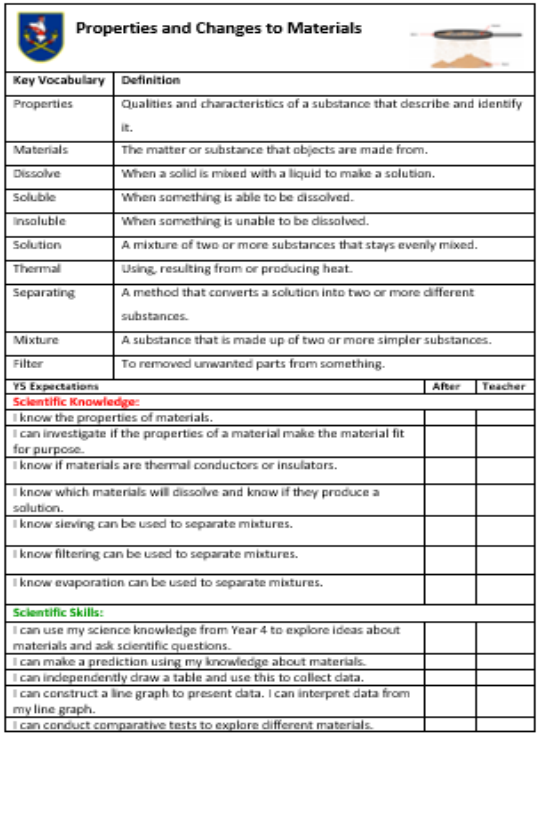
Cultural

- Through their Science learning the children at Latimer learn about famous people from the past and their influence on today's modern world. Famous figures include Mary Anning, Sir Isaac Newton and Charles Darwin.
- Children are taught how important Science is to the world and the enormity of its global impact.

Science Successful Learning Grids

Science successful learning grids are used by all year groups across Latimer to outline specific knowledge and skills which will be taught within a unit. These are in line with national curriculum expectations for each year group and reflect the expectations of the Latimer curriculum.

They are adapted for different year groups to also indicate key vocabulary children are expected to know by the end of a unit.



Properties and Changes to Materials

Key Vocabulary	Definition
Properties	Qualities and characteristics of a substance that describe and identify it.
Materials	The matter or substance that objects are made from.
Dissolve	When a solid is mixed with a liquid to make a solution.
Soluble	When something is able to be dissolved.
Insoluble	When something is unable to be dissolved.
Solution	A mixture of two or more substances that stays evenly mixed.
Thermal	Using, resulting from or producing heat.
Separating	A method that converts a solution into two or more different substances.
Mixture	A substance that is made up of two or more simpler substances.
Filter	To removed unwanted parts from something.

Y5 Expectations	After	Teacher
Scientific Knowledge:		
I know the properties of materials.		
I can investigate if the properties of a material make the material fit for purpose.		
I know if materials are thermal conductors or insulators.		
I know which materials will dissolve and know if they produce a solution.		
I know sieving can be used to separate mixtures.		
I know filtering can be used to separate mixtures.		
I know evaporation can be used to separate mixtures.		
Scientific Skills:		
I can use my science knowledge from Year 4 to explore ideas about materials and ask scientific questions.		
I can make a prediction using my knowledge about materials.		
I can independently draw a table and use this to collect data.		
I can construct a line graph to present data. I can interpret data from my line graph.		
I can conduct comparative tests to explore different materials.		

Y3 Plants
Successful Learning Grid

Science Knowledge: **Substantive Knowledge**	
I can identify and describe the function of several parts of a flowering plant	
I can understand what plants need for life and growth.	
I can understand what is meant by water transportation in plants and describe this process.	
I can describe how some plants reproduce.	
I can name different ways in which seeds are dispersed.	
Science Skills: **Disciplinary Skills**	
Posing Questions: Ask questions about the world around you.	
Planning: Make suggestions about how to find things out/collect data in order to answer a question.	
Plan and set up an experiment to collect data about water transportation.	
Plan and set up a fair test.	
Observing & Gathering information: Record relevant observations. Fill in a blank table with help.	
Interpreting Information: Record the results of my experiment and discuss the findings.	
Give reasons for a result.	
Discuss findings using scientific language.	

Scientific Vocabulary we will learn:

Leaves-usually green, attached to the stem or stalk, used for photosynthesis Stem-the main body or stalk of a plant Roots-the underground part of a plant Fruit-part of the plant that contains the seed Carpel-the female parts of the plant Flower-the seed bearing part of the plant Ovary-this holds the ovule Ovule-the female seed cell Photosynthesis-the process through which plants make their own food from sunlight (photo='light' + synthesis='putting together') Pollen-a fine yellowy powder, made in male parts of the plant Veins-used to transport water and nutrients between the leaves and the stem Pollination-the transfer of pollen from the male to the female part Root hairs-tiny hairs on the roots that help extract water from the soil
Seed Dispersal-the process through which seeds are spread across the ground Sepals-part of the plant that protects the flower before it opens Style-connects the stigma to the ovary Stigma-top of the style, sticky part that collects pollen from pollinators Stamen-the males parts of a plant; the anther and the filament

Science Vocabulary

Research has outlined the huge importance of developing science-based vocabulary. Teachers ensure that key vocabulary is visited regularly throughout lessons.

EYFS begin the children's vocabulary development journey by naming everyday materials, their body parts, common animals and their body parts and by talking about the weather daily and the effects of it on the environment.

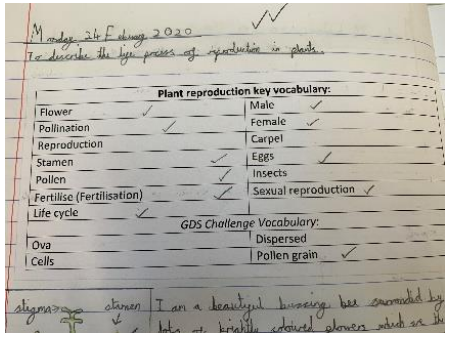
Pre-unit tasks might include a retrieval of the previous years' vocabulary to check that the children have retained knowledge of it.

Teachers encourage the use of correct terminology to describe, name and to discuss their findings. Lessons often begin with a few minutes' retrieval of previously learned vocabulary, not just from the current unit but from previously learned units also.

All vocabulary with missing words in the definition:

Solid	Stays in one place and can be held. Most keep their shape and do not flow like a liquid. These always take up the same amount of space and do not spread out.
Liquid	These can flow or be poured easily. They are not easy to hold. They change shape depending on the container they are in.
Gas	These are often invisible. They do not keep their shape and will spread to fill whatever container they are in.
Heat	This is the transfer of energy from a one object to another due to a difference in temperature.
Cool	A verb which means a material's temperature is becoming colder.
Evaporation	When a liquid turns into a gas.
Freeze	The process when a substance changes from a liquid to a solid.
Condensing	The process when a gas turns into a liquid.
Water cycle	This is the process of water being 'recycled' over and over again as water on earth is always moving.

Children are regularly encouraged to refer to their Successful Learning Grids to seek definitions and spellings of new words ready to use in their science-based writing.
Any errors or incorrect use of the key vocabulary is quickly identified and then there is an expectation that these corrections are discussed and corrected.
For an outline of the progression of vocabulary see individual unit overviews**.**

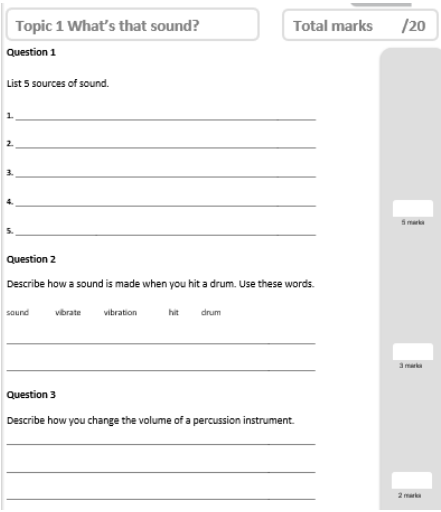


Cut and mix these. Children put together to create their own STEM sentences.

Solid materials	Liquid materials	Gas materials
can be squashed.	forms a pool in your hand, not a pile.	escapes from an unsealed container.
keep their shape.	takes the shape of the bottom of a container.	spreads out to take the shape of the entire container.
can be cut or shaped.	can be poured.	do not keep the same volume.
keep the same volume.	keep the same volume.	

End of unit assessment/reflection of knowledge:

At the end of each Science unit, every year group completes an end of unit assessment which reflects their learned knowledge of a unit. For key stage two, these assessments are taken from the Switched on Science scheme and adapted where necessary, for example to include additional questions linked to vocabulary. Key stage one create their own assessments linked with national curriculum expectations and the curriculum maps. Scores are tracked in the back of Science books. These inform future planning and end of year summative assessments.


Topic 1 What's that sound? Total marks /20

Question 1

List 5 sources of sound.

1. _____
2. _____
3. _____
4. _____
5. _____

Question 2

Describe how a sound is made when you hit a drum. Use these words.

sound vibrate vibration hit drum

_____

_____

Question 3

Describe how you change the volume of a percussion instrument.

_____

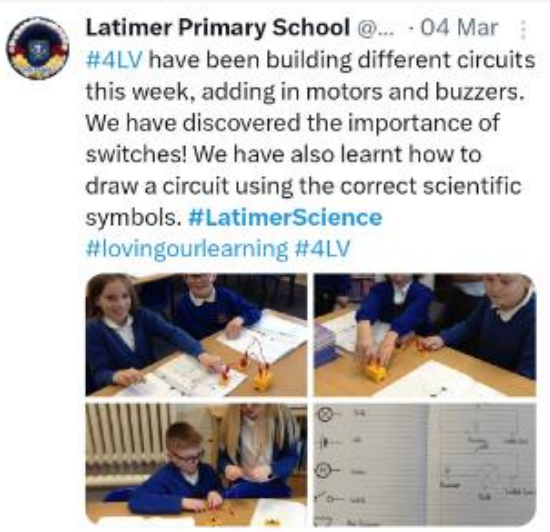
_____

_____

Enrichment and child-led practical learning

The teaching of Science through real-life, hands on experience is paramount at Latimer. Children learn through experiencing scientific trips and visitors which makes Science learning meaningful. Science is also taught through practical investigations which enable children to apply their scientific skills to real-life experiences. We regularly tweet the successes of our students and celebrate their achievements.

Science: Successful Learning



Science: Overview

Overview of Science units across the school

Year Group					
EYFS	**'The Natural World'-** • Explore the natural world around them, making observations and drawing pictures of animals and plants. • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.				
Y1	Plants	Animals including humans	Everyday materials	Seasonal Changes	
Y2	Plants	Animals including humans	Uses of everyday materials	Living things and their habitats	
Y3	Plants	Animals, including humans	Rocks	Light	Forces and Magnets
Y4	Living things and their habitats	Animals including humans	States of matter-	Sound	Electricity
Y5	Living things and their habitats	Animals including humans	Properties and changes of materials	Earth and space	Forces
Y6	Living things and their habitats	Animals, including humans	Evolution and inheritance	Light	Electricity

Science: Overview

	Posing questions	Planning	Observing and gathering information	Interpreting/reporting findings
EYFS	Ask questions to find out more and to clarify and check their own understanding.	Use talk to help work out problems and organise thinking and activities, explain how things work and why things happen.	Explore how things work and explore the natural world around them. Looking at physical evidence.	Make observations, talk about what they notice and draw pictures to show their understanding. Make comments about what they have heard and offer explanations as to why things happen.
Year 1	-With support (as a group or class) make simple statements about the world and what they see; ask simple questions about how things work.	-Make suggestions about what to do to answer a question. -Identify simple data to collect with teacher. -Recognise some hazards. -Begin to say what might happen.	-Carry out simple tests. -Describe observations using pictures and short sentences. -Use a Venn diagram to sort objects into groups according to a given criterion. -Use non-standard measurements and simple equipment to collect data.	-Use simple tables to communicate findings (e.g. tick or cross) -Construct and interpret a simple pictogram (I unit) to present data. -Make some comparisons between results. -Rank results in order. -Say if what happened was expected.
Year 2	-Independently make simple statements about the world and what they see; ask some scientific questions: How? Why? What would happen if?'	-Identify things to measure or observe that are relevant to a question or being investigated. -Use a simple text to find information with help. -Make a simple prediction based on experience with little explanation.	-Suggest what to observe. -Describe observations using scientific vocabulary. -Choose appropriate standard units for measure and use these with help. -Suggest criterion for grouping objects.	-Use tables to communicate findings (more challenging than tick or cross eg .note observations, rank) -Construct a pictogram, tally chart or simple bar graph to present data. -Interpret these tables and graphs. -Make a comparative statement about what results show. -Begin to communicate using scientific language.
Year 3	-With support, ask relevant questions about patterns or observations in the world around them.	-Make some suggestions about how to find things out or how to collect data to answer a question -Identify range of data to be collected with help	-Record relevant observations or measurements with some support. -Accurately read simple scales (length, capacity and mass with simple increments of 2,5,10,100)	-Construct a bar graph to present data (scale is more than 1) -Identify patterns in results -Give reasons for results -Interpret a bar graph where the scale is more than 1

		-Plan and set up fair and comparative tests with support -Use more than one simple text to find out information-Make a prediction based upon everyday experience and give a simple reason.	-Fill in a blank table with help and use this to collect data. -Use keys to classify objects. -Make a series of observations or measurements.	-Communicate findings using some scientific language
Year 4	-Independently, ask relevant questions about patterns or observations in the world around them.	Identify one or more control variables in investigations from those provided. -Independently choose equipment and decide what to measure from equipment provided. -Suggest how to control hazards -Make a prediction based upon everyday experience and give a simple reason.	-Accurately read a thermometer. -Independently construct a table with suitable headings and use this to collect data. -Develop own key to classify objects with support.	-Decide upon a suitable scale for a bar graph. -Interpret a grouped bar graph. -Identify results that don't fit a pattern. -Explain results using scientific evidence. -Suggest improvements to working methods
Year 5	-With support, use their science experiences to explore ideas and raise different kinds of questions.	-Independently select appropriate equipment to answer a question -Independently select range of data to be collected with some help to select intervals. -Identify some relevant variables. -Independently select information from a range of texts. -Make a prediction based on scientific knowledge	-Make repeat observations or measurements adequate for the task (for accuracy). -Accurately read a Newton meter. -Independently construct a table (with suitable headings and space for repeat tests) and use this to collect data. -Develop own key to classify objects.	-Construct and interpret a line graph to present data. -Explain results that don't fit a pattern. -Suggest improvements to working methods and give reasons for these. -Identify evidence that disproves or supports ideas. -Communicate findings using relevant scientific language
Year 6	-Independently, use their science experiences to explore ideas and raise different kinds of questions.	-Select own equipment and explain why it is appropriate. -Identify an appropriate approach to answer a scientific question. -Select the most significant variable in an investigation. -Make a prediction based upon the relevant scientific concept	-Make repeat observations and measurements systematically (for accuracy). -Accurately read a range of scales. -Use a database to classify objects.	-Construct line graphs where the intermediate values have meaning. -Construct pie charts and scatter graphs to present data. -Explain results with more detailed scientific explanations. -Suggest improvements to working methods and suggest alternative approaches. -Plan a follow up test and predict the results for this. -Calculate the mean for a set of results.