

CUSP SCIENCE Handbook

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Written by Alex Bedford

CUSP SCIENCE Handbook

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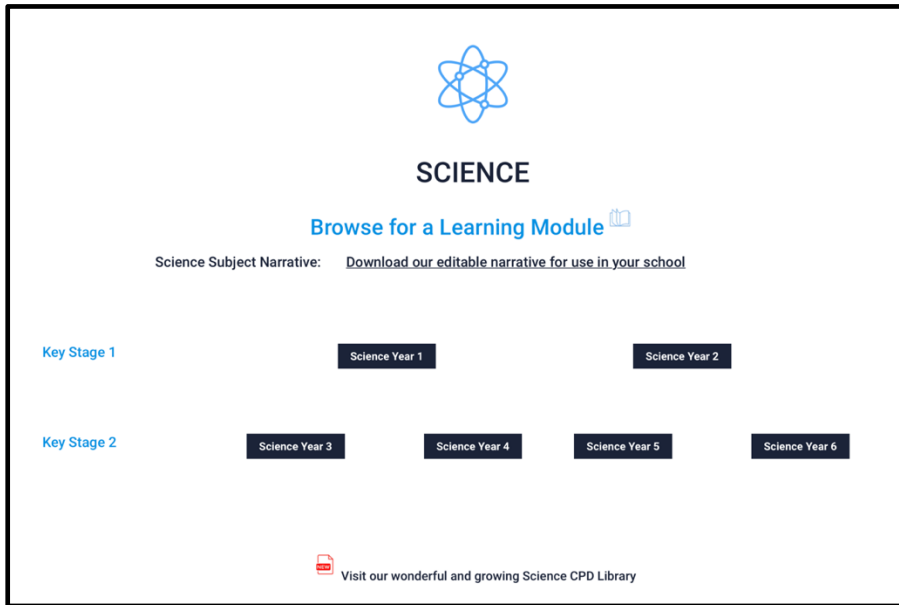
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1. INTRODUCTION

INTRODUCTION



The screenshot shows the CUSP Science website. At the top is a blue atom logo and the word "SCIENCE". Below it is a link to "Browse for a Learning Module". A "Science Subject Narrative" section contains a link to "Download our editable narrative for use in your school". A grid of buttons represents "Key Stage 1" (Science Year 1, Science Year 2) and "Key Stage 2" (Science Year 3, Science Year 4, Science Year 5, Science Year 6). At the bottom, there is a link to "Visit our wonderful and growing Science CPD Library".



The screenshot shows the "Science CPD Library" page. It features a red brain icon with circuitry. The text states: "Where professional growth enables teachers to realise the potential of excellence." Below this is a note: "Click on the links in the drop down box below to access brilliant CUSP Science CPD led by the wonderful Pip Headlam (who loves the CUSP modules!)". A green bar contains the text "Press + to reveal the CUSP Science CPD Library". A list of resources is shown:

1. CUSP Science
2. CUSP Working Scientifically
3. Minimum expectations in practice
4. CUSP Assessment in Science for impact
5. Basic subject knowledge in biology, chemistry and physics
6. Creating Curious Learners
7. Developing Oracy through Science

Additional resources listed are "2016 Science Sampling Commentary Booklet" and "2016_sciencesamplepublicrelease_Commentary_Booklet_V9". A "NEW" tag is next to "CUSP Thinking Science Notes Guidance".

CUSP Science pays close attention to guidance provided by the National Curriculum sequence and content. It is infused with evidence-led practice and enriched with retrieval studies to ensure long-term retention of foundational knowledge. The foundations of CUSP science are cemented in the EYFS through learning within the Natural World, and People, Culture and Communities.

Our ambitious interpretation of the National Curriculum places knowledge, vocabulary, working and thinking scientifically at the heart of our principles, structure and practice.

CUSP Science precisely follows the units outlined in the National Curriculum. We also offer guidance on the teaching of foundational knowledge through mixed aged classes.

Through studying CUSP science, pupils become **'a little more expert'** as they progress through the curriculum, accumulating, connecting and making sense of the rich substantive and disciplinary knowledge.

This guidance is supported by Ofsted documents and research papers, including:

<https://www.gov.uk/government/publications/research-review-series-science/research-review-series-science>

We have taken the National Curriculum Primary Science headlines to define each domain.

Biology

is the study of living things (organisms), their structure and environments.

In the Primary Curriculum it is the study of

|
Animals, including humans
Plants
Living things and their habitats
Evolution and inheritance

Physics

is the study of matter, forces and motion, sound, light and waves, electricity and magnetism and Earth in Space.

In the Primary Curriculum it is the study of

|
Seasonal changes
Light
Forces and magnets
Electricity
Sound
Forces and
Earth in Space
Light

Chemistry

is the study of the composition, behaviour and properties of matter, and of the elements of the Earth and its atmosphere.
(BBC Bitesize)

In the Primary Curriculum it is the study of

|
Everyday materials
Uses of everyday materials
Rocks
States of matter
Properties and changes of materials

1. WHAT PUPILS WILL KNOW

Substantive knowledge - this is the subject knowledge and explicit vocabulary used to learn about the content. Common misconceptions are explicitly revealed as non-examples and positioned against known and accurate content. In CUSP Science, an extensive and connected knowledge base is constructed so that pupils can use these foundations and integrate it with what they already know. Misconceptions are challenged carefully and in the context of the substantive and disciplinary knowledge. In CUSP Science, it is recommended that misconceptions are not introduced too early, as pupils need to construct a mental model in which to position that new knowledge.

2. WHAT PUPILS WILL DO

Disciplinary knowledge – this is knowing how to collect, use, interpret, understand and evaluate the evidence from scientific processes. This is taught. It is not assumed that pupils will acquire these skills by luck or hope. Pupils construct understanding by applying substantive knowledge to questioning and planning, observing, performing a range of tests, accurately measuring, comparing through identifying and classifying, using observations and gathering data to help answer questions, explaining and reporting, predicting, concluding, improving, and seeking patterns. We call it '**Working Scientifically.**' CUSP Science provides Working Scientifically coverage maps to check the balance of provision in KS1, Lower and Upper KS2. They are also present in the Whole Class Assessment toolkits.

Scientific analysis is developed through IPROF criteria. We call it '**Thinking Scientifically.**'

- identifying and classifying
- pattern seeking
- research
- observing over time
- fair and comparative testing

These will be mapped throughout CUSP Science against each knowledge note.

3. **Substantive concepts** include concrete examples, such as 'plant' or more abstract ideas, such as 'biodiversity'. Concepts are taught through explicit vocabulary instruction as well as through the direct content and context of the study.

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2. PRINCIPLES

PRINCIPLES

A guiding principle of CUSP Science is that each study draws upon prior learning. For example, in the EYFS, pupils may learn about **The Natural World** through daily activities and exploring their locality and immediate environment. This is revisited and positioned so that new and potentially abstract content in Year 1, such as Animals, including humans, is related to what children already know. This makes it easier to cognitively process. This helps to accelerate new learning as children integrate prior understanding.

CUSP Science is organised into three distinct subject domains: biology, physics and chemistry. Where inter-disciplinary concepts are encountered, such as the particle model, these are taught explicitly and connected across science domains.

CUSP Science has sequenced the national curriculum into meaningful and connected 'chunks' of content to reduce the load on the working memory as well as creating coherent and strong long-term memories. The sequence of substantive and disciplinary knowledge enables pupils to become 'more expert' with each study and grow an ever broadening and coherent mental model of the subject. This guards against superficial, disconnected and fragmented scientific knowledge and weak disciplinary knowledge. High frequency, multiple meaning words (Tier 2) are taught explicitly and help make sense of subject specific words (Tier 3). Each learning module in CUSP Science has a vocabulary module with teacher guidance, tasks and resources to enhance and deepen understanding.

CUSP Science is planned so that the retention of knowledge is much more than just 'in the moment knowledge'. The cumulative nature of the curriculum is made memorable by the implementation of Bjork's desirable difficulties, including retrieval and spaced retrieval practice, word building and deliberate practice tasks. This powerful interrelationship between structure and research-led practice is designed to increase substantive knowledge and accelerate learning within and between study modules. That means the foundational knowledge of the curriculum is positioned to ease the load on the working memory: new content is connected to prior learning. The effect of this cumulative model supports opportunities for children to associate and connect significant scientific concepts, over time, and with increasing expertise and knowledge.

CUSP Science deliberately pays attention and values the importance of subject content as well as the context it is taught in. Common scientific misconceptions are identified in all CUSP Science learning modules. These misconceptions are made explicit to pupils. Children draw upon substantive and disciplinary knowledge to reason and practise acquiring the conception, whilst repelling the misconceptions. Examples and non-examples are powerful ways of saying what something is and what something isn't.

CUSP Science values the study of scientists from the past as well as promoting diverse present-day role models in the field. These studies help us to learn how they used, at that time, their substantive and disciplinary knowledge to develop a conception. This illuminates how misconceptions can permeate substantive knowledge and appear to be a known truth. An example of this is the study of Maria Merion in Year 5, who was born in Germany in 1667. She observed and drew insects going through biochemical metamorphosis. She challenged the misconception that all insects were evil, born from mud and were the work of the devil. Further examples of contextual misconceptions and refinement of conceptions can be seen in the study of Galen's views about blood circulation in AD 157 and William Harvey's findings in 1602.

CUSP fulfils and goes well beyond the expectations of the National Curriculum as we believe there is no ceiling to what pupils can learn if the architecture and practice is founded in evidence-led principles.

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3. CURRICULUM ARCHITECTURE

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i. LONG-TERM SEQUENCE

AN EXAMPLE OF THE LONG-TERM SEQUENCE FOR SCIENCE – EYFS to KS1

	ELG's	How this is achieved in EYFS	Key Vocabulary to be developed in EYFS		Science KS1	
					Year 1	Year 2
Specific Area of Learning Understanding the World	<p>Managing Self</p> <ul style="list-style-type: none"> Manage their own basic hygiene and personal needs, including dressing, going to the toilet, and understanding the importance of healthy food choices. <p>ELG 14 The Natural World</p> <ul style="list-style-type: none"> Explore the natural world around them, making observations and drawing pictures of animals and plants. 	<ul style="list-style-type: none"> Discussions at snack time of the importance of healthy food choices. During lunch time discussions. Through stories and circle time discussions, e.g. the story – Now wash your hands and Funny bones. P.E lessons that encourage getting dressed and undressed independently. Naming body parts through songs – Heads, shoulders, knees, and toes. RSE link – Correct naming of body parts. Talking about pets at home. Exploring minibeasts and recording our observations. 	<ul style="list-style-type: none"> Exercise Healthy Wash Toothbrush Tooth / Teeth Body Head Bones Skeleton Family 	<ul style="list-style-type: none"> Animal Human Mammal Bird Fish Amphibian Insect Lifecycle Nocturnal 	Animals, including humans.	
	<p>ELG 14 The Natural World</p> <ul style="list-style-type: none"> Explore the natural world around them, making observations and drawing pictures of animals and plants. 	<ul style="list-style-type: none"> Going on walks to observe the local environment and to compare and learn about the seasons. Taking photos to compare seasons and discuss. Planting seeds and plants. Looking after the EYFS garden. Creating bug hotels. 	<ul style="list-style-type: none"> Lifecycle Plant seed grow roots Flower 	<ul style="list-style-type: none"> Seasons Autumn Winter Spring Summer Change Weather 	Plants	
	<p>ELG 14 The Natural World</p> <ul style="list-style-type: none"> Understanding some important processes and changes in the natural world around them, including seasons and changing states of matter. 	<ul style="list-style-type: none"> Growing plants from bulbs and seeds. Making boats to explore best materials. Water tray activities to explore water, ice, and materials that float and sink. Testing the best material for a raincoat for Paddington bear. 	<ul style="list-style-type: none"> Material Wood Plastic Glass Float 	<ul style="list-style-type: none"> Sink Liquid Solid 	Everyday materials	Uses of everyday materials.
Scientific Vocabulary – scientist, sort, observation, identify, compare, group, investigate, test, evaluate						

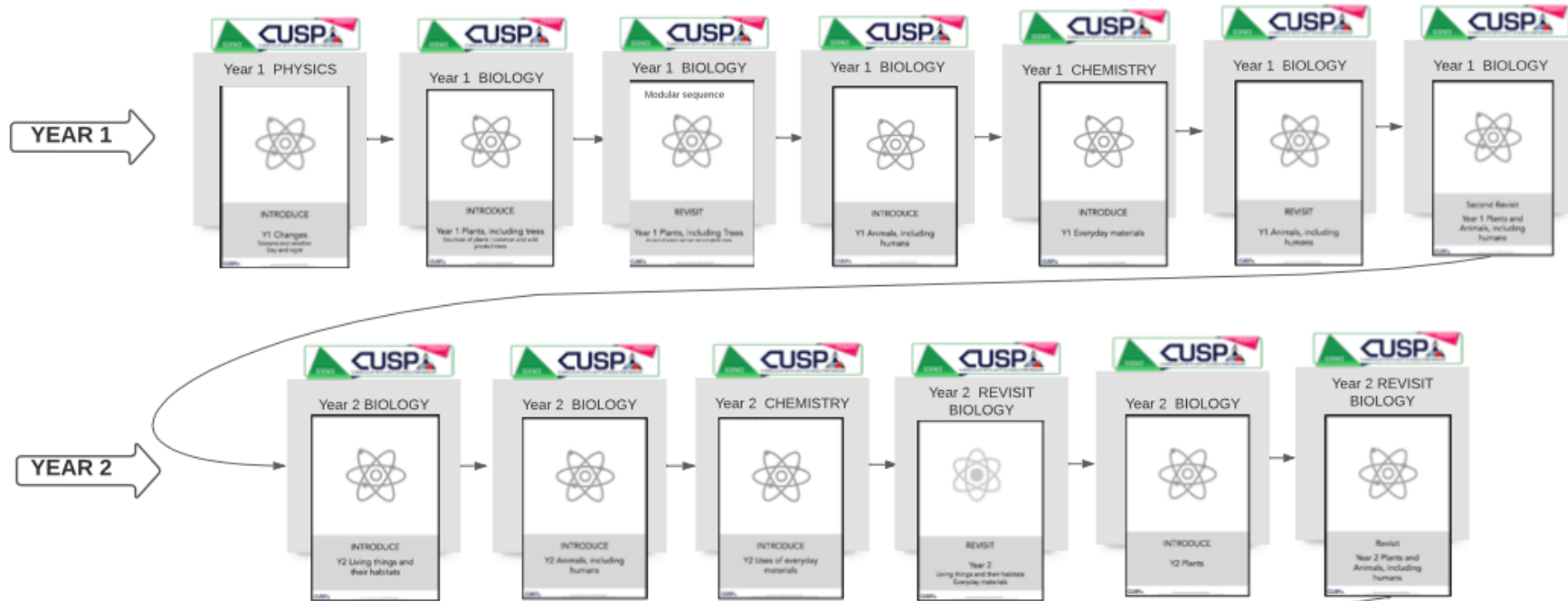
AN EXAMPLE OF THE LONG-TERM SEQUENCE FOR SCIENCE Year 1 – Year 6

(This model shows conceptual sequence and references where the content may be taught:

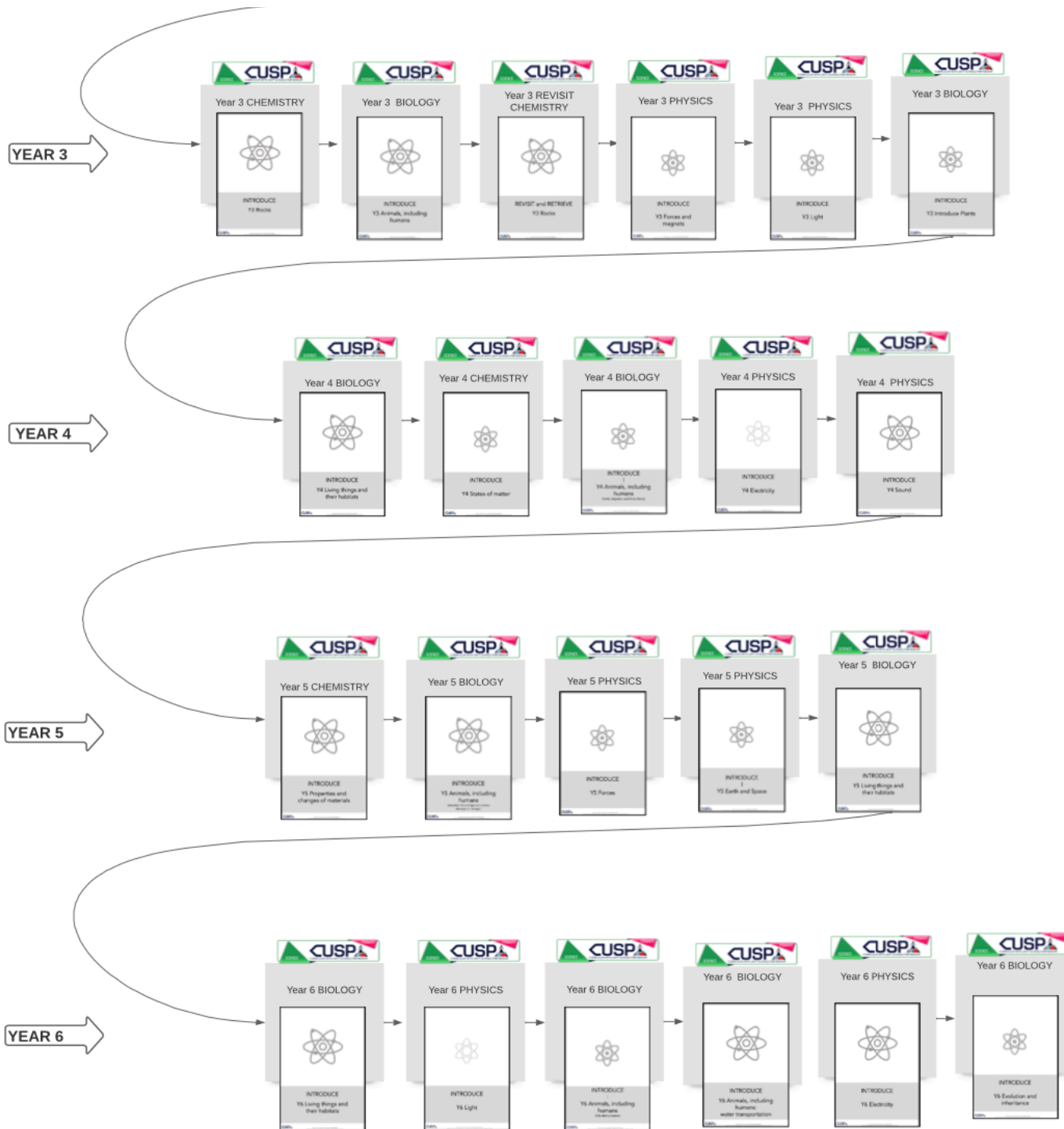
AT = Autumn Term, SprT = Spring Term, ST = Summer Term

	EYFS Understanding the world	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Biology (53% of Science content)	The Natural World Explore the natural world around them, making observations and drawing pictures of animals and plants.		Living things and their habitats (+ revisit modules) (AT)		Living things and their habitats (AT)	Living things and their habitats (ST)	Living things and their habitats (AT)
		Plants (AT / ST))	Plants (ST)	Plants (ST)			
		Animals, including humans (AT) (+ revisit modules) (SpT / ST))	Animals, including humans (AT) (+ revisit modules) (SpT / ST))	Animals, including humans (AT)	Animals, including humans (SprT)	Animals, including humans (AT)	Animals, including humans (SpT)
							Evolution and inheritance (ST)
Physics (29% of Science content)	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.	Seasonal changes (+ revisit module) (AT)		Light (SpT)			Light (AT)
				Forces and magnets (SpT)		Forces (SpT / ST)	
					Electricity (ST)		Electricity (ST)
					Sound (ST)		
						Earth and space (SpT)	
Chemistry (18% of Science content)		Everyday materials (SpT)	Use of everyday materials (SpT)			Properties and change of materials (AT)	
				Rocks (AT) (+ revisit module) (AT)			
					States of matter (AT)		

Key Stage 1



Key Stage 2



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3. CURRICULUM ARCHITECTURE

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ii. WIDER CURRICULUM CONNECTIONS

CURRICULUM ARCHITECTURE

BIOLOGY WIDER CURRICULUM CONNECTIONS

The purpose of this is to strengthen the memory trace and build coherent long-term schemata. Teachers draw upon content and orchestrate tasks to consolidate or elaborate what pupils KNOW and CAN DO.

Coming soon...

PHYSICS WIDER CURRICULUM CONNECTIONS

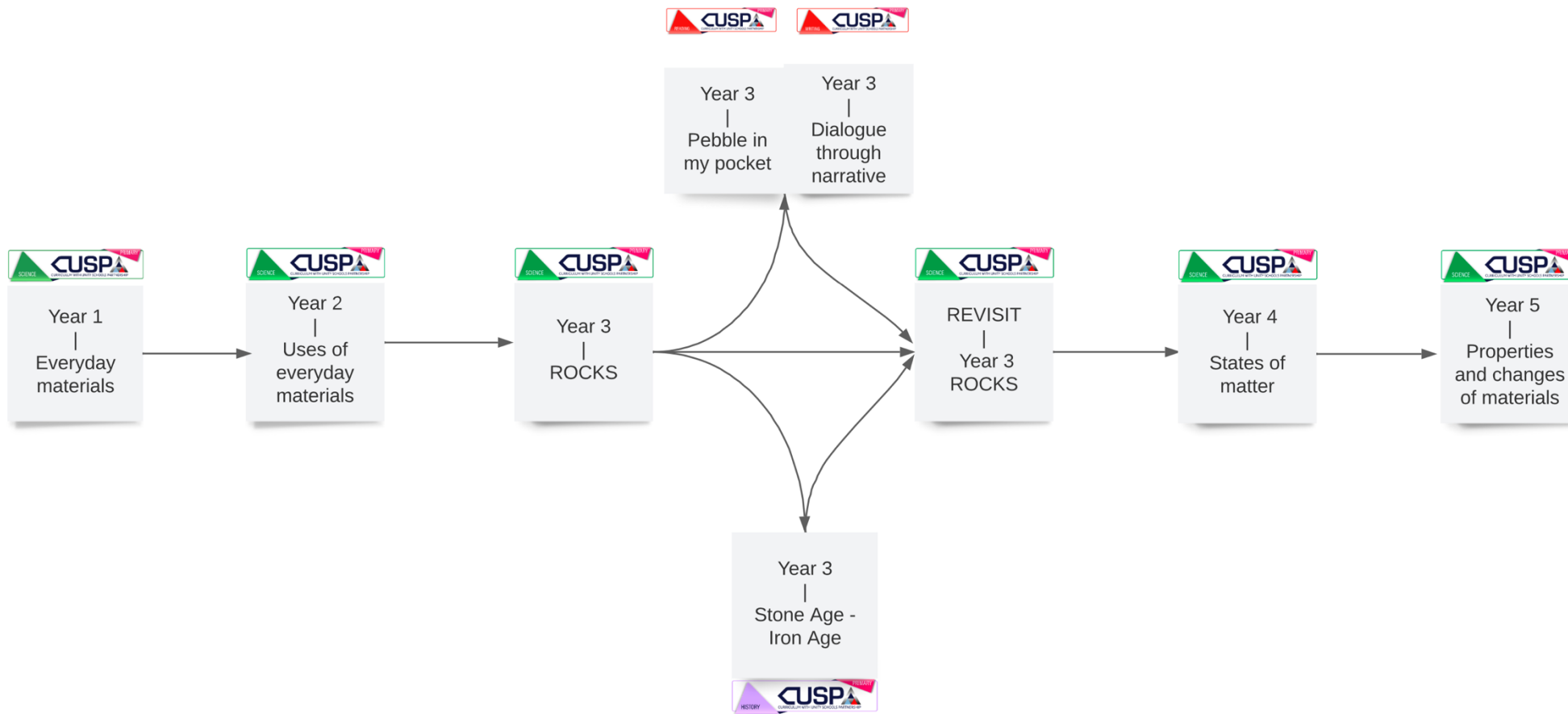
The purpose of this is to strengthen the memory trace and build coherent long-term schemata. Teachers draw upon content and orchestrate tasks to consolidate or elaborate what pupils KNOW and CAN DO.

Coming soon...

CURRICULUM ARCHITECTURE (Example)

AN EXAMPLE OF CHEMISTRY WIDER CURRICULUM CONNECTIONS. More to come...

The purpose of this is to strengthen the memory trace and build coherent long-term schemata. Teachers draw upon content and orchestrate tasks to consolidate or elaborate what pupils KNOW and CAN DO.



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4. PROFESSIONAL DEVELOPMENT

Delve into the CPD online library

Understanding the Science curriculum and the national landscape



Pip Headlam



CPD Session 2

Teaching working scientifically

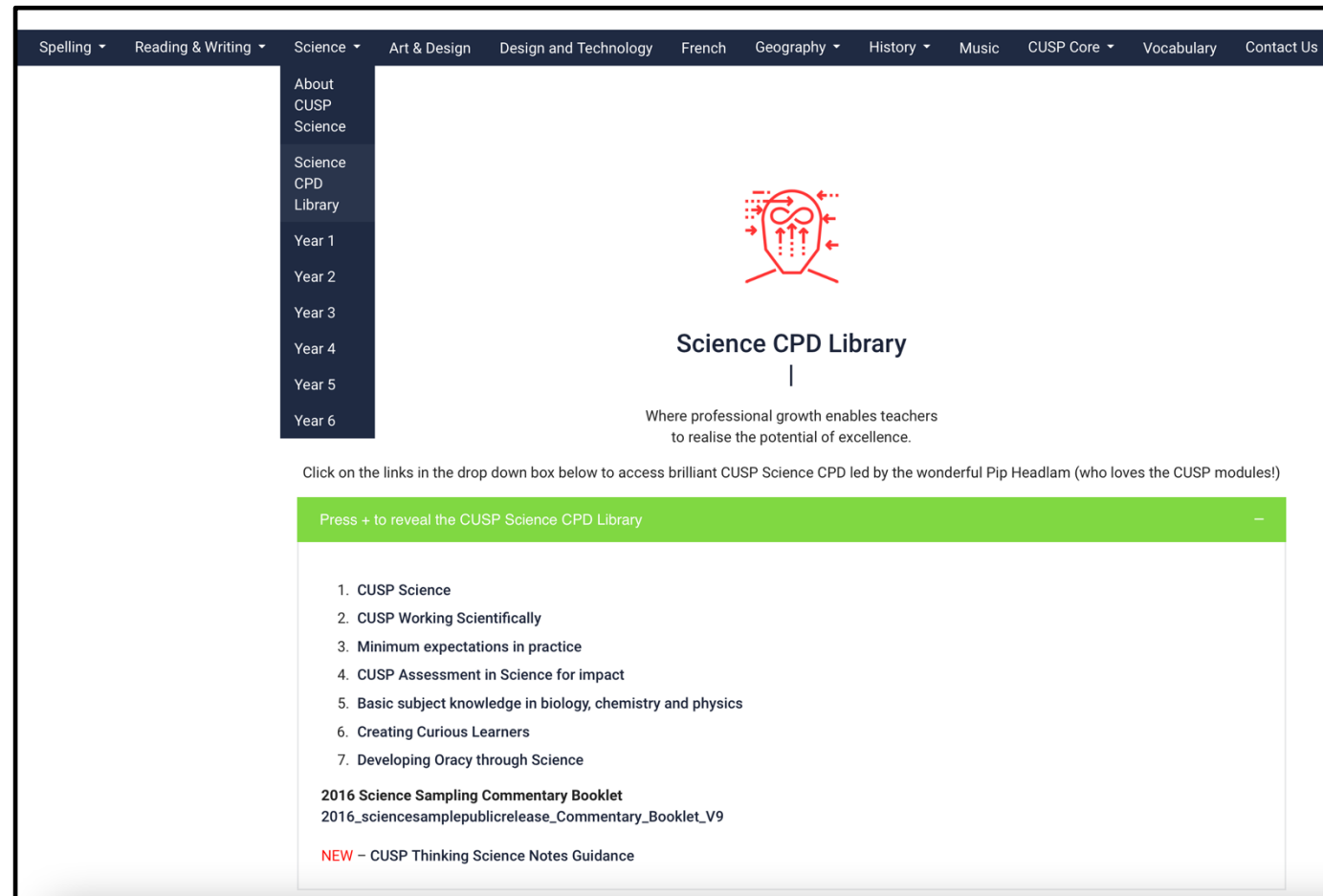


Pip Headlam



Science CPD Session 3

Minimum expectations in practice

Pip Headlam





The screenshot shows the website's navigation menu with 'Science' selected, leading to a sub-menu where 'Science CPD Library' is highlighted. The main content area features a red brain icon with arrows, the title 'Science CPD Library', and a tagline: 'Where professional growth enables teachers to realise the potential of excellence.' Below this is a list of links to various CPD resources, including 'Cusp Science', 'Cusp Working Scientifically', and '2016 Science Sampling Commentary Booklet'. A green button prompts users to 'Press + to reveal the CUSP Science CPD Library'.

Science CPD Session 4

Assessment in Science for impact



Pip Headlam



Science CPD Session 5

Basic subject knowledge in biology, chemistry and physics



Pip Headlam



Science CPD Session 6

Creating curious learners



Pip Headlam



Science CPD Session 7

Developing oracy through Science

Pip Headlam



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5. WORKING SCIENTIFICALLY MAPS

(Thinking like a scientist)

Very useful for Subject Leaders to monitor and check the balance of opportunities that pupils have to think like a scientist. Does the science learning offer represent a balanced, relevant and proportional diet of all these areas? Are some areas less used than others? Why?

Use these to identify highlight or spotlight areas, not for coverage, but as a focus for that specific skill. Otherwise, you could just tick all the boxes all the way through and it becomes meaningless.

WORKING SCIENTIFICALLY

Pupils make more sense and deeper understanding of the substantive concepts and knowledge by using what they know through disciplinary knowledge.

Use the Working Scientifically Maps to identify the opportunities to think hard and use the substantive content in a disciplinary manner by thinking like a scientist. You do not need to tick off all the boxes all the time. Identify the working scientifically areas that are relevant to the study you want to focus the attention on.

Download them from any CUSP Science Year group -

Science
Year 1 Learning Modules

Templates to help map Working Scientifically in KS1

Year 1 Science Provision Map – Working Scientifically

	Asking simple questions and recognising that they can be answered in different ways	Observing closely, using simple equipment	Performing simple tests	Identifying and classifying	Using their observations and ideas to suggest answers to questions	Gathering and recording data to help in answering questions.
Plants						
Animals, including humans						
Everyday materials						
Seasonal changes						

Year 3 Science Provision Map – Working Scientifically

	Ask relevant questions	Set up simple, practical enquiries and comparative and fair tests	Make accurate measurements using standard units, using a range of equipment, e.g. thermometers and data loggers	Gather, record, classify and present data in a variety of ways to help in answering questions	Record findings using simple scientific language, drawings, labelled diagrams, bar charts and tables	Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions	Use results to draw simple conclusions and suggest improvements, or new questions and predictions for setting up further tests	Identify differences, similarities or changes related to simple, scientific ideas and processes
Plants								
Animals, including humans								
Rocks								
Light								
Forces and magnets								

Year 5 Science Provision Map – Working Scientifically

	Plan enquiries, including recognising and controlling variables where necessary	Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work	Take measurements, using a range of scientific equipment, with increasing accuracy and precision	Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs, and models	Report findings from enquiries, including oral and written explanations of results, explanations involving causal relationships, and conclusions	Present findings in written form, displays and other presentations	Use test results to make predictions to set up further comparative and fair tests	Use simple models to describe scientific ideas, identifying scientific evidence that has been used to support or refute ideas or arguments
Living things and their habitats								
Animals including humans								
Properties and changes of materials								
Earth and space								
Forces								

THINKING SCIENCE TASKS TO SUPPORT WORKING SCIENTIFICALLY

These unique CUSP resources give teachers the opportunity to consolidate or elaborate pupil thinking through disciplinary knowledge tasks.

I = Identifying and classifying

P = Pattern seeking

R = Research using secondary sources

O = Observing

F = Fair and comparative testing

IMPORTANT NOTE

The substantive knowledge (content of the lesson) must be explained with examples given before the THINKING TASKS are attempted, applied or used as a challenge.

This is guidance given in the Ofsted research review series.


Do not give pupils a thinking task without teaching them the content first – that is a weak proxy for learning, and it won't help children make sense of the content or create long-term memory.

P36 and section 9 goes into more detail.

What are the four seasons?

Autumn


September, October, November



Leaves fall from the trees.
It gets cooler.

Winter


December, January, February



It is cold.

Spring


March, April, May



It is warmer.
Plants grow.

Summer



June, July, August




It is hotter.
Trees have lots of leaves.

Year 1 Changes Seasons and weather Day and night


Q1 What are the four seasons?

Sorting  Matching 


Print and cut out the separate elements from Slide 14 of the CUSP Science unit. Work as a class to order the months of the year. Label four hoops with one of each of the seasons. Show and describe an image representing a month. Pupils decide which hoop it goes into. Continue until all the months are sorted. Encourage pupils to explain their reasoning using visual cues from the images.

Identifying  **I PROF**


Give groups of pupils the same resources as for the previous task. Ask them to sort the months correctly into their hoops. Then, taking it in turns, one pupil moves away whilst the remainder swap two of the months over or switch two hoop titles. Can the returning pupil spot the mistakes and explain how they know?

Describing 


Give each group a copy of the images from Slides 16 – 19 of the CUSP Science unit. Pupils take it in turns to secretly select one of the seasons illustrated. They give the others a verbal clue to the chosen season in **one sentence only**. Using the sentence stem *In this season ...*, can the others identify the correct season? Encourage pupils to work together to see how many they can guess correctly in a set time. Challenge: If pupils have more than one turn, previous clues cannot be repeated.

Observing  **I PROF**

Go into the school grounds or alternative setting with drawing materials. Encourage pupils to look closely at a deciduous tree. Confirm the current season and ask pupils how what they observe about the trees indicates this. Then ask them to predict and draw what the tree will look like in the next season. Share responses.


Reasoning 

Share the image of Autumn leaves from Slide 16 of the CUSP Science unit. Ask pupils where the fallen leaves go to.

Applying 

Ask pupils to illustrate how each season affects their daily life in terms of:

- the clothes they wear
- the activities they do.



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6. KEY STAGE NARRATIVE

KEY STAGE 1

Pupils study the **Seasons** and develop an early conceptual understanding of how **day becomes night**. An understanding of change over time connects to the study of **Plants, including trees**. This focus enables children to associate trees as belonging to the plant kingdom and notice the changes deciduous trees go through connected to the seasons.

Contrasting that study, pupils learn about **Animals, including humans**. Non-examples of plants are used to contrast the features of an animal.

Pupils are introduced to **identifying and classifying materials**. Scientific terms, such as transparent, translucent and opaque are taught explicitly through vocabulary instruction and pupils make further sense by applying it to what they know and then to working and thinking scientifically tasks. This substantive knowledge is enriched by pupils' use of disciplinary knowledge through scientific enquiry.

To sophisticate their understanding, Year 1 pupils revisit the study **Animals, including humans** as a retrieval module and deepen their knowledge through revisiting and thinking hard through increasingly challenging tasks.

As pupils progress through KS1, new knowledge is integrated with pre-existing understanding. For example, in Year 2, the study of **Living things and their habitats** and **Uses of everyday materials**, engages pupils to integrate and draw upon their knowledge of **Animals, including humans** as well as **Plants**, and the study of **Materials**. New substantive knowledge is constructed and made sense of through **Working and Thinking scientifically** tasks.

KEY STAGE 2

In CUSP Science, substantive knowledge is always present and acts as a precursor for pupils' understanding. This will enable them to successfully apply disciplinary knowledge. In KS2 we introduced disciplinary scientific terms, including:

- variable
- independent variable
- dependent variable
- controlled variable

These give structure to working and thinking scientifically tasks in relation to the substantive knowledge taught in that specific study.

“what scientists observe, or choose to control in an experiment, depends on what they know. For example, classifying flowering plants scientifically requires knowledge of floral parts to place specimens in appropriate groups. However, classifying insects requires knowledge of body parts.”

Ofsted Research Series: Science, 2021

In KS2 CUSP Science, we have defined these terms:

- **variable** - the things that can change in a science experiment.
- **independent variable** - the *variable* that is changed by the scientist.
- **dependent variables** - are the things that the scientist watches closely for to see how they *respond* to the change made to the *independent variable*.
- **controlled variables** - the things that a scientist wants to remain the same and not change so they can see how the independent variable reacts.

LOWER KEY STAGE 2

The unit on **Rocks** is studied and connected with prior knowledge from 'Everyday materials' in KS1. A study of **Animals, including humans** is built upon from KS1 and contrasts the physical features with the functions they perform, including the skeleton and muscles.

Rocks is revisited again to sophisticate and deepen pupils' knowledge, advancing their understanding.

Forces and magnets are introduced and connect with KS1 materials, including twisting, bending and squashing. Contact and non-contact forces are taught and understanding applied through Working and Thinking Scientifically. The abstract concept of **Light** is made concrete through knowing about light sources and shadows. **Plants** are studied to develop a more sophisticated understanding of their parts and functions, including pollination.

A study of **Living things and their habitats** pays close attention to classification and is directly taught using prior knowledge to ensure conceptual frameworks are secure. Explicit vocabulary instruction supports pupils to deconstruct words for their component meaning, for example **invertebrate**. **Animals, plants and environments** are connected in this study with a summary focusing on positive and negative change.

Electricity is introduced. Substantive knowledge is taught so that pupils acquire understanding about electrical sources, safety and components of a single loop circuit. Practical tasks give pupils the opportunity to think using disciplinary knowledge in the context of variables. Pupils make sense of what they know by testing, proving and disproving hypotheses.

Animals, including humans focuses on the sequence of digestion, from the mouth to excretion. Misconceptions, such as digestion begins in the stomach, are pre-empted, limited and represented as non-examples.

States of matter and **Sound** are taught using knowledge of the particle theory. Acquiring substantive knowledge about 'states' of matter supports pupils to understand how solids, liquids and gases behave. This knowledge is connected further to geographical studies of the **Water cycle** and life processes. Practical scientific tasks and tests help pupils build a coherent understanding of the particle theory by applying what they know through structured scientific enquiry. Misconceptions, such as 'liquid particles are slightly more separated than gas and less compacted than solids' are addressed.

UPPER KEY STAGE 2

In the study of **Properties and changes of materials**, it is important that pupils reuse and draw upon their understanding of states of matter. This prior content eases the load on the working memory to process and make sense of new knowledge, including solutions, mixtures, reversible and irreversible changes.

Change is also studied **within Animals, including humans**, focusing on growth and development of humans and animals.

Earth in Space develops the conceptual understanding of our place in the universe. This study unwraps misconceptions, including the Moon changing shape, the Sun moving across the sky and how seasons occur.

A study of **Forces** sophisticates the substantive knowledge acquired in KS1 and LKS2. New content, including air resistance and water resistance is studied. Force multipliers, such as levers are studied to understand how we can be efficient with effort. For example, a spanner with a long handle multiplies the force and makes it easier to turn a bolt than spanner with a shorter handle. Simple machines, such as pulleys are also studied as force multipliers – they move the load through a greater distance with the same energy being used. Enhancing this study of **Forces**, pupils learn about Galileo Galilei 1564 - 1642 (considered the father of modern science).

Living things and their habitats focuses on differences in life cycles of living things and how they reproduce. This study also contrasts previous scientific thinking. Pupils contrast how people in the past thought and constructed understanding, in the absence of scientific evidence, to explain things they didn't understand. Maria Merion is the significant scientist studied, she observed closely and carefully drew insects undergoing biochemical metamorphosis. David Attenborough describes Maria Merion as one of the most important contributors to the field of entomology.

A further study of **Living things and their habitats** enables pupils in UKS2 to revisit and add to their understanding of classification through the taxonomy created by Carl Linnaeus. More complex animals are studied, including invertebrates such as Myriapods and Echinodermata (starfish and Sea urchins) as well as Arthropods such as Crustacea, Arachnids, and Insects.

Light is revisited and taught with advanced substantive knowledge. This is physics study with a focus on the properties of light, not the biology of the eye.

The study of **Animals, including humans** enables pupils to add new knowledge to their mental models of biological systems. Circulation, the components of blood and the mechanism of the heart is connected to healthy living through diet and exercise. Many of these science studies are enriched and conceptual frameworks extended through the deliberate curriculum choice to study charts and graphs in Maths, food in Design Technology or reuse and retrieve substantive knowledge in other contexts, such as in writing.

Further retrieval learning modules are deployed, so that pupil knowledge can be advanced and sophisticated to increase their depth of understanding.

Electricity is enhanced with an advanced study of electrical circuits. New substantive knowledge is acquired in the context of the particle theory, which was previously studied. Working and Thinking scientifically tasks help to deepen and make sense of new learning, such as the concept of electricity and the way we explain it using terms such as charge, potential difference and flow.

Evolution and inheritance introduces two significant scientists - Charles Darwin and Alfred Wallace as pioneers of scientific thinking in the field of evolution. This study draws on how misconceptions may have been arrived at to explain the past and how theories explain significant change, over time. Substantive concepts, including adaption and variation are taught explicitly through vocabulary and clarity is achieved through worked examples. This supports pupils to use this substantive knowledge in a disciplinary way.

IMPORTANT CONSIDERATIONS

1. Through excellent teaching and generative tasks, the connection between the scientific content and the context needs to be made relevant to the everyday lives of children.
2. Through great teaching of CUSP Science, we must encourage pupils to be curious learners who are inquisitive, ask questions and think hard.
3. CUSP Science seeks to empower pupils to ask relevant scientific questions as well as begin to answer them using substantive and disciplinary knowledge.

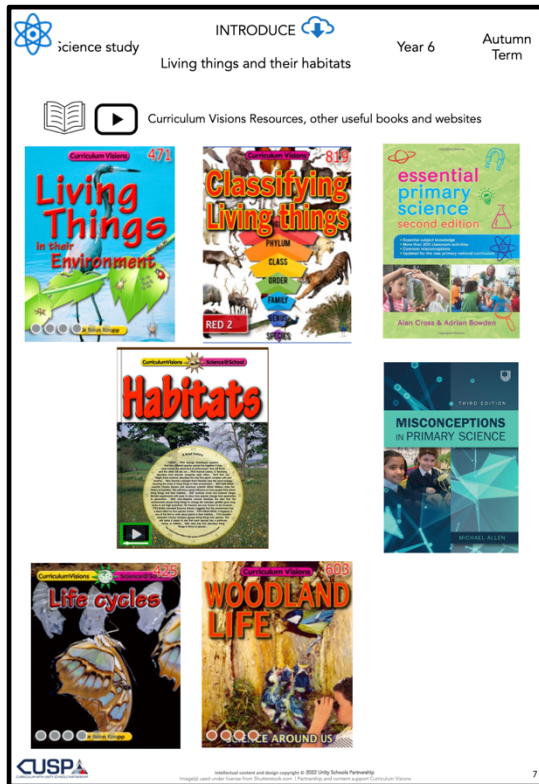
We've worked very hard to make sure that the CUSP Science resources support these important considerations and more.

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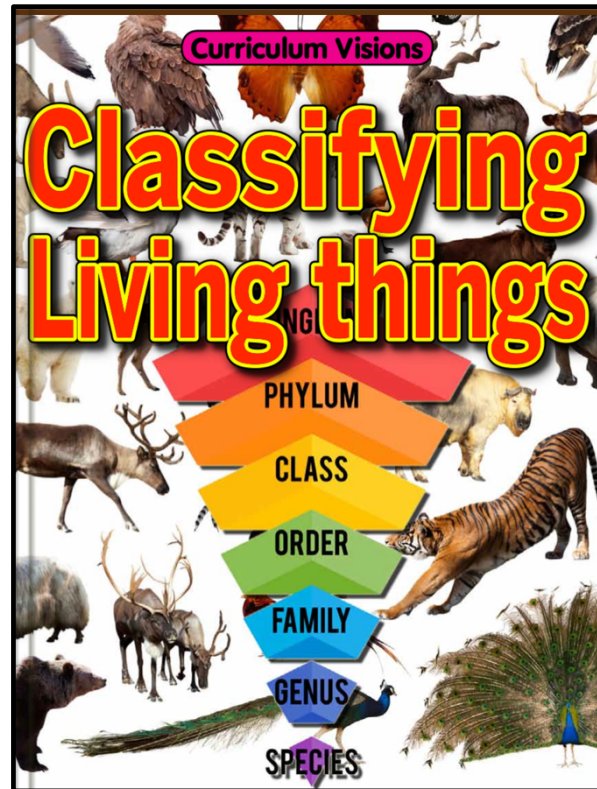
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7. READING AS A SCIENTIST

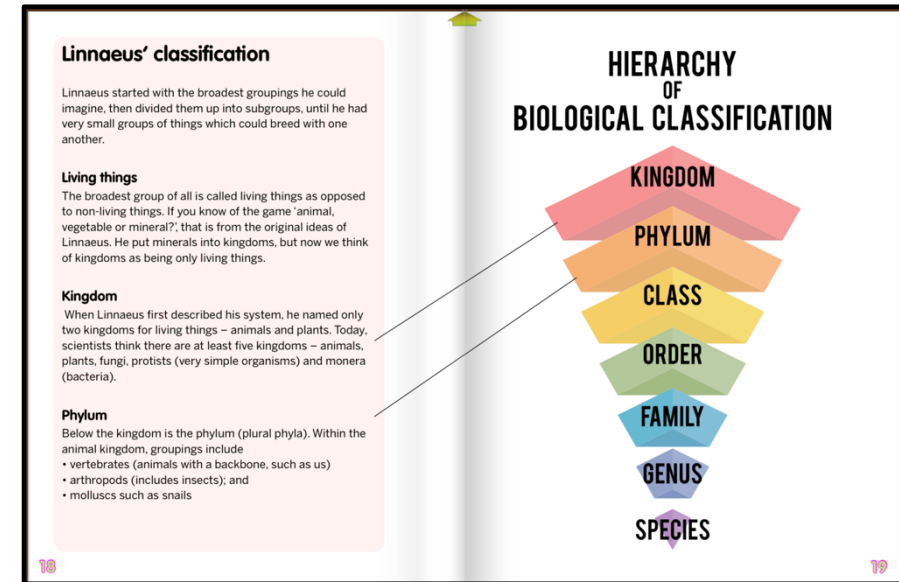
We recommend subscribing to **CurriculumVisions**  to support high quality non-fiction texts that can also be accessed at home.



Recommend reads are referenced in the Learning Modules.



Books are digital and can be used to support teacher subject knowledge.



The digital book can also be used as part of the explain and example phase of a lesson, or as a point of reference for pupils during the lesson on iPads or other digital devices. The weblink can be sent home enabling pupils to read P18 and P19, for example, as pre-reading or review for a quiz.

Schools subscribing to CUSP can get a 10% discount off Curriculum Visions' annual fees. Contact Dr Brian Knapp bjk@atlanticeurope.com for more information.

CUSP SCIENCE Handbook

8. STRUCTURE and CONTENT

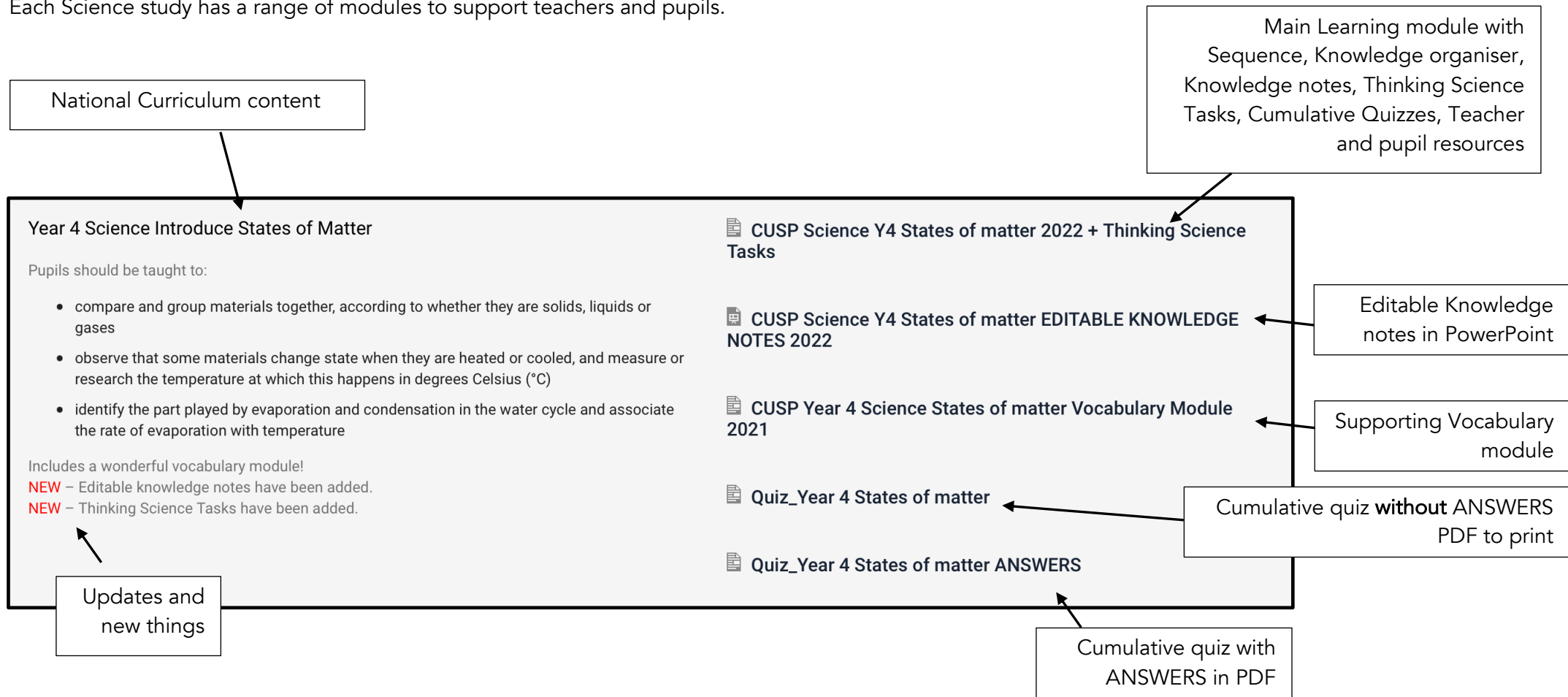
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What are Learning and Vocabulary modules?

How could they be used?

Structure and content

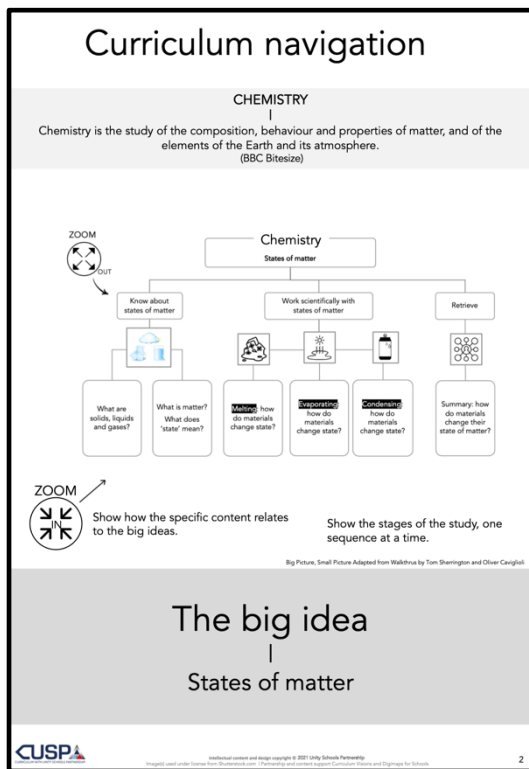
Each Science study has a range of modules to support teachers and pupils.



CUSP Science resources contain a wealth of evidence-led materials to support excellent teaching and long-term learning.

BIG IDEA

Defines the overarching concept.
Maps lesson connection and progression.



HOW IT CAN BE USED

Connect lessons to the overarching concept.
Visualise the sequence of learning.
Connect with and to prior learning.
RETRIEVAL / SPACED RETRIEVAL PRACTICE.

TEACHER PAGE

References Prior Learning as well as Working Scientifically.
Highlights common misconceptions (Learning traps).

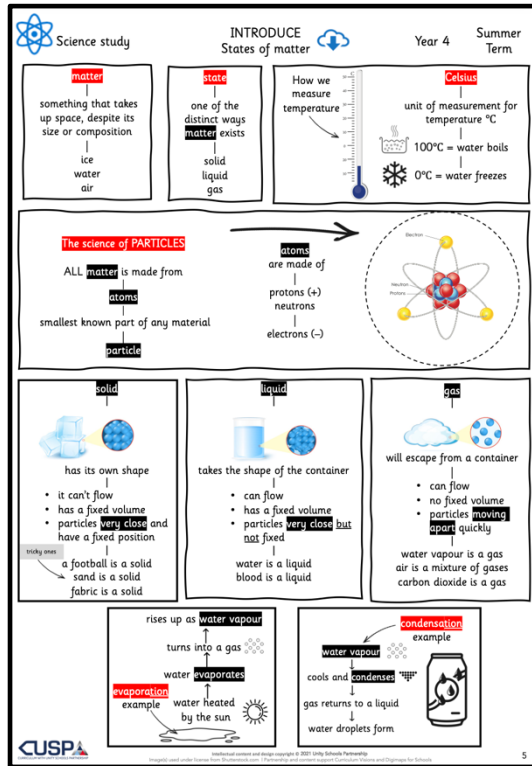
HOW IT CAN BE USED

Navigate prior learning and build on long-term memory.
Spotlight a focus for Disciplinary Knowledge through Working Scientifically.
Teacher and pupil awareness: avoid falling into the trap of misconception.

KNOWLEDGE ORGANISER

A Point of Reference

Communicates minimum substantive knowledge expectations.



HOW IT CAN BE USED

Connects lessons to the overarching concept and knowledge.

Chunks key knowledge, to reduce extraneous load.

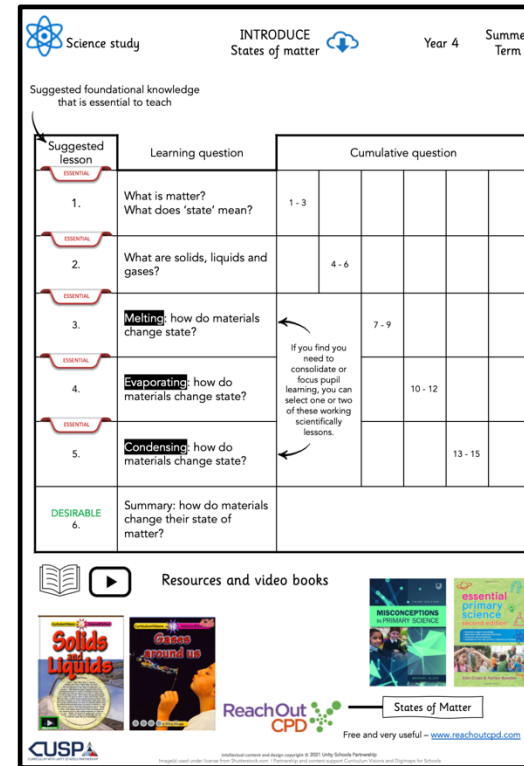
Connect with and to prior learning.

RETRIEVAL / SPACED RETRIEVAL PRACTICE.

SEQUENCE, QUESTIONS, RESOURCES

References Prior Learning as well as Working Scientifically.

Highlights common misconceptions (Learning traps).



Lessons build cumulatively and coherently on prior learning.

ESSENTIAL lesson content identified – this must be taught.

DESIRABLE lesson content identified – this could be taught, but if you need to address class misconceptions or want to consolidate a lesson, then it can be reallocated.

RECOMMENDED READS
Includes a wonderful digital non-fiction library through CURRICULUM VISIONS. (subscription needed)

HOW IT CAN BE USED

Navigate prior learning and build on long-term memory.

Spotlight a focus for Disciplinary Knowledge through Working Scientifically.

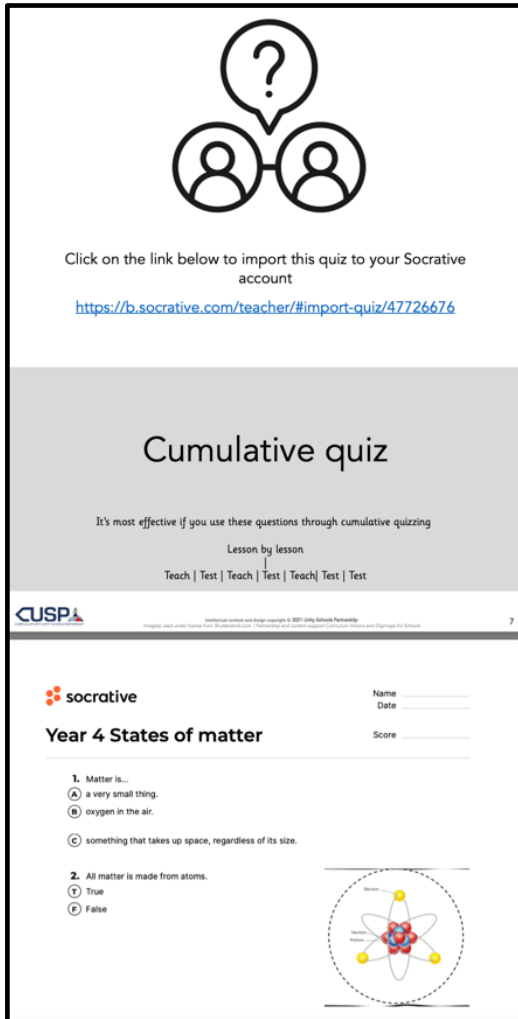
Teacher and pupil awareness: avoid falling into the trap of misconception.

CUMULATIVE QUIZ (Year 2 onwards)

A learning tool to support remembering of taught content.
Informs formative and summative assessment practice.
Identifies misconceptions and informs corrective practice.

At the end of a lesson or start of new lesson to build on prior knowledge.
Initially through TEACHER PACED mode to model questions.

Lesson by lesson feedback – what do pupils know?



Click on the link below to import this quiz to your Socrative account
<https://b.socrative.com/teacher/#import-quiz/47726676>

Cumulative quiz

It's most effective if you use these questions through cumulative quizzing

Lesson by lesson
Teach | Test | Teach | Test | Teach | Test | Test

CUSPA Curriculum with Unity Schools Partnership

socrative Name _____ Date _____ Score _____

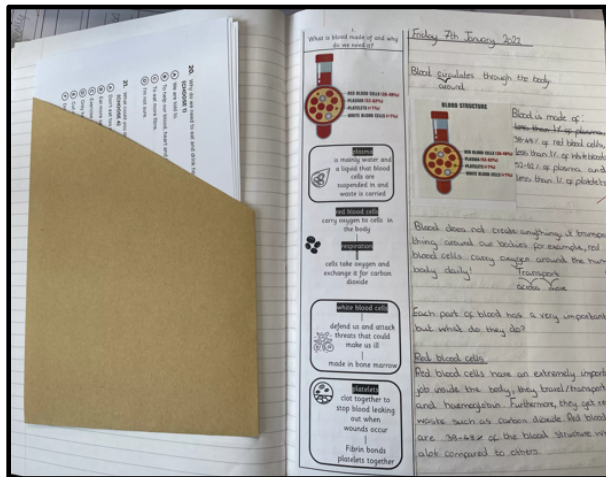
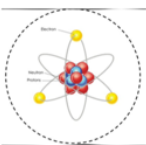
Year 4 States of matter

1. Matter is...

- A a very small thing.
- B oxygen in the air.
- C something that takes up space, regardless of its size.

2. All matter is made from atoms.

- T True
- F False

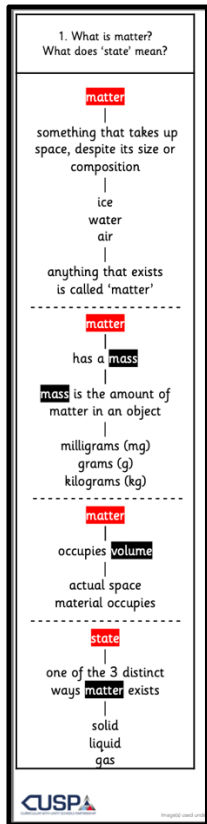


HOW IT CAN BE USED

Once routines embedded, INSTANT FEEDBACK mode can be used.
Summative assessment at the end of the study.
SPACED RETRIEVAL PRACTICE – activate previous quizzes to activate relevant memories.
Can be kept in a simple cut down A5 envelope.

KNOWLEDGE NOTES

Locational points of reference communicating what pupils will KNOW.
Communicates the lesson question.
Supports explicit vocabulary instruction.



Lesson questions are introduced at the start of teaching. They set the scene and set pupils on a quest.

Enables pupils to attend to the teacher instruction and follow the lesson. Pupils mark up on the KN as the teacher references content. It acts as a simple, physical, location cue.

A clear point of reference enabling pupils to engage in tasks without forgetting the content.

Focuses attention as one source of essential lesson content.

HOW IT CAN BE USED

KN used as a WORKED EXAMPLE by the teacher.
REDUCES SPLIT ATTENTION EFFECT.
Makes VOCABULARY unmissable.
Supports guided and independent practice.
Enables productive GENERATIVE LEARNING tasks to be undertaken.

THINKING SCIENCE TASKS

A menu of DISCIPLINARY KNOWLEDGE tasks to help pupils make sense of the substantive knowledge.

Year 4 States of matter		
Q1 What is matter? What does 'state' mean?		
Recreating	Connecting	
Do pupils know the name of the tiny units that make up all matter? (atoms) Do they recognise that molecules are formed when atoms join together? Provide pupils with an image of half an atom and half a water molecule (H ₂ O) and ask them to complete the other symmetrical halves. Challenge: On the water molecule, which atoms do H and O stand for? (hydrogen, oxygen)		
Reasoning	Measuring	I PROF
As it states on the Knowledge Note, <i>matter occupies volume</i> . Maggie says, "All objects / materials that have the same mass occupy the same volume." Do you agree or disagree with her? Justify your answer to a partner using sound scientific reasoning. Next, direct pupils to demonstrate how they can prove whether Maggie is correct or not, e.g. put a 200g piece of cheese in a measuring cylinder containing a given amount of water and calculate how much the water level rises, then repeat with a 200g metal weight and compare.		
Questioning		
Ask pupils if the mass of a sealed packet of crisps will change if: <ul style="list-style-type: none"> it is taken to the moon. it is placed at the bottom of the sea. it is put in the freezer. the crisps inside are crushed. Pupils must justify their answers by explaining their reasoning. They should recognise the mass will remain unchanged in each scenario.		
Reasoning		
Gael says that if you melt chocolate with holes in it, melt ice, grate a piece of cheese or squash a sponge, the mass will be changed. Do you agree or disagree with Gael? Explain your reasoning to a partner. Challenge: Which of the above would be hardest to prove / disprove?		
Connecting		
Working in pairs, ask pupils to list as many different forms of precipitation / water as possible, e.g. hail, sleet, snow, water vapour, frost, ice, steam, rain and then to group them according to their own categories. If they have not already done so, direct them to classify them as solids, liquids and gases before comparing their groupings with another pair, justifying any differences.		

Teacher choice – DO not expect to use all tasks within a lesson.

Select ONE OR TWO tasks that you think will consolidate and elaborate pupil understanding related to the teaching of the knowledge note.

NOT to be used before the explicit instruction of the content in the knowledge note.

They have a skills focus to work in tandem with the substantive knowledge as well as developing the working scientifically skills.

Provides relevant and sophisticated CHALLENGE for pupils to think hard about the content – creating coherent long-term memory.

HOW IT CAN BE USED

Thinking science tasks are used to engage pupils to think hard about the substantive knowledge, including vocabulary.
As part of the ATTEMPT, APPLY OR CHALLENGE phases of a lesson.
At the start of a lesson (CONNECT phase) to review and reuse prior knowledge.

PRINTABLE KNOWLEDGE NOTES

Print out the knowledge notes so pupils have a physical point of reference to work with and make sense of the content

<p>1. What is matter? What does 'state' mean?</p> <p>matter</p> <p>something that takes up space, despite its size or composition</p> <p>ice water air</p> <p>anything that exists is called 'matter'</p> <hr/> <p>matter</p> <p>has a mass</p> <p>mass is the amount of matter in an object</p> <p>milligrams (mg) grams (g) kilograms (kg)</p> <hr/> <p>matter</p> <p>occupies volume</p> <p>actual space material occupies</p> <hr/> <p>state</p> <p>one of the 3 distinct ways matter exists</p> <p>solid liquid gas</p>	<p>1. What is matter? What does 'state' mean?</p> <p>matter</p> <p>something that takes up space, despite its size or composition</p> <p>ice water air</p> <p>anything that exists is called 'matter'</p> <hr/> <p>matter</p> <p>has a mass</p> <p>mass is the amount of matter in an object</p> <p>milligrams (mg) grams (g) kilograms (kg)</p> <hr/> <p>matter</p> <p>occupies volume</p> <p>actual space material occupies</p> <hr/> <p>state</p> <p>one of the 3 distinct ways matter exists</p> <p>solid liquid gas</p>	<p>1. What is matter? What does 'state' mean?</p> <p>matter</p> <p>something that takes up space, despite its size or composition</p> <p>ice water air</p> <p>anything that exists is called 'matter'</p> <hr/> <p>matter</p> <p>has a mass</p> <p>mass is the amount of matter in an object</p> <p>milligrams (mg) grams (g) kilograms (kg)</p> <hr/> <p>matter</p> <p>occupies volume</p> <p>actual space material occupies</p> <hr/> <p>state</p> <p>one of the 3 distinct ways matter exists</p> <p>solid liquid gas</p>
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HOW IT CAN BE USED

Every pupil has a KN.

USE a double page spread and choose the location of the KN depending on if the child is left or right-handed, also the tasks deployed. It could go in the centre of the double page.

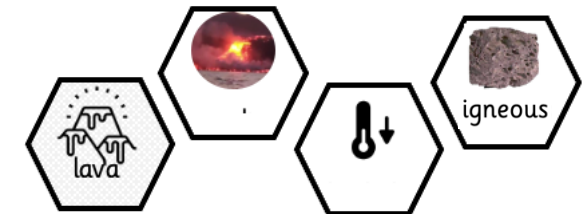
EDITABLE KNOWLEDGE NOTES

Enabling you to make REASONABLE ADJUSTMENT for pupils with SEND / EHCP to make sense of the content.

<p>How are rocks formed?</p> <p>igneous</p> <p>made from cooled molten rock - lava or magma</p>
<p>molten rock</p> <p>rock that is so hot it becomes liquid</p>
<p>lava is molten rock above the earth's crust</p> 
<p>magma is molten rock under the earth's crust</p>
<p>rocks are natural and not made by humans</p>

Download EDITABLE KNOWLEDGE NOTES from the Study module on the CUSP website.

Use the THINKING HARD resources to enable all pupils to focus their attention and make sense of the content.



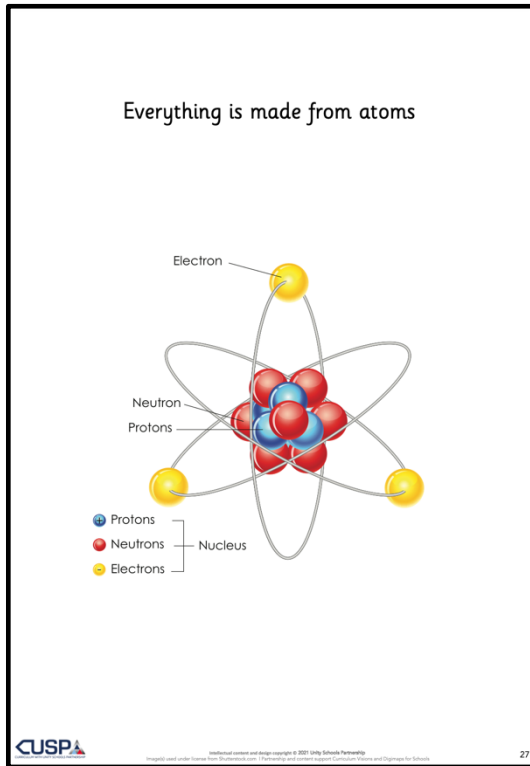
HOW IT CAN BE USED

Keep the lesson question.

Select essential content you want a pupil to access and remember. Chunk the KN if needed – select relevant content and cut / snip the parts you know will be the most relevant and accessible for that pupil.

CUSP RESOURCES

High quality images to support the substantive and disciplinary knowledge within the study.



HOW THEY CAN BE USED

Use as a WORKED EXAMPLE.

Structured prompt: give to pupils to use and explain what they know.
Use as image prompts in books to help pupils select the correct knowledge.

CUSP RESOURCES

High quality images to support the substantive and disciplinary knowledge within the study.



HOW THEY CAN BE USED

Supports Science Thinking Tasks.
Relate to the lesson question and taught content.
Use to sophisticate and challenge pupils to explain what they know.

VOCABULARY MODULE
(Separate document in the study module)

SUPPORTS EXPLICIT VOCABULARY INSTRUCTION
TEACHER PAGE

Y4 States of matter
Vocabulary Essentials: Teacher Guide

Prior vocabulary knowledge

Words I should know	Roots, prefixes, suffixes and spelling rules
heat, cool, temperature, change, freeze compare, materials, properties	-tion -ing

Vocabulary for explicit instruction

Tier 2 multiple meaning or high frequency		Tier 3 subject specific	
permanent	existing all the time	evaporate	turn from liquid into vapour
particle	a very small piece of something	condense	turn from vapour into liquid
solid	a substance that is neither a gas nor a liquid	melt	to become a liquid as a result of heating
liquid	a substance that flows freely and is not a solid or a gas	matter	the physical substance that everything is made up of
gas	a substance that is neither a solid nor a liquid	state	the physical condition that a thing is in
vapour	small drops of liquid in the air	volume	the amount of space that an object or substance fills

Etymology and morphology for explicit instruction

Prefix / Suffix / Root	Meaning	Examples
part	bit, fragment	particle, partial, particular
re	again, back	reverse, reversible, return

Relevant idioms and colloquialisms

cooking on gas	to make rapid progress or perform well
out of gas	completely exhausted or having no energy
be in/get into a state	to become excited or anxious

Moving beyond

- composition
- disperse
- reversible, irreversible

CUSP

Point of reference of words, roots, prefixes, suffixes and spelling rules pupils should know.

Definition and examples of:
Tier 2
Tier 3

Etymology and morphology
Idioms and colloquialisms.

Moving beyond vocabulary.

HOW IT CAN BE USED

Gives consistency in vocabulary instruction.
Ensures teacher subject knowledge is accurate and ambitious.

TEACHER / PUPIL PAGES-

Use as whole class example or cut elements out to use in books.

Vocabulary Essentials: Pupil Organiser
KS2 Study: Y4 States of matter

Prior vocabulary knowledge

Words I should know	Roots, prefixes, suffixes and spelling rules
heat, cool, temperature, change, freeze compare, materials, properties	-tion -ing

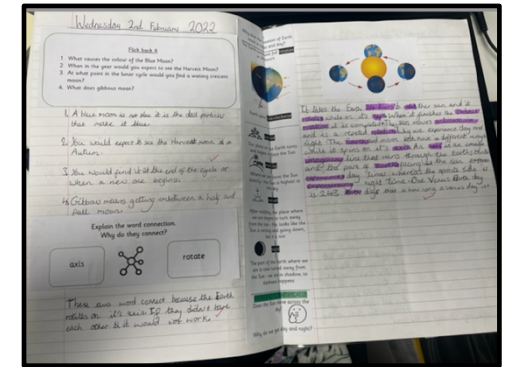
T2 Multiple meaning or high frequency words

KNOW LINK ANALYSE Use and apply in a sentence

permanent	
particle	
solid	
liquid	
gas	
vapour	

CUSP

Can be digitally or physically snipped and used at the point of learning in a lesson.



HOW IT CAN BE USED

EXTRACTS can be lifted or simply written in books – most effective when they are used at the point of learning.
Can be used as a worked example to model vocabulary instruction.

VOCABULARY SCRIPTING

Teach vocabulary using sections from these templates.

Vocabulary Essentials Pupil organiser Study: Y4 States of matter

Prior vocabulary knowledge

Words I should know	Roots, prefixes, suffixes and spelling rules
heat, cool, temperature, change, freeze, compare, materials, properties	-tion -ing

T3 Subject specific vocabulary for this study

KNOW	LINK	ANALYSE	Use and apply in a sentence
evaporate			
condense			
melt			
matter			
state			
volume			

CUSPA Curriculum with Unity Schools Partnership

Don't be tempted to ask pupils what they think a word means if foundational knowledge isn't secure.

Evaporate, that's an interesting word. I'm going to teach you what it means.

My turn – 'Water evaporates when it is heated.'

(Hear it in context)

'ev-ap-o-rate' (Our turn)

evaporate means to turn from liquid to a vapour.
(Define)

Strong sunlight makes water evaporate from lakes.

(Hear in different context)

Evaporate is a word I might use to describe the effect of heat on a liquid.
(Link beyond synonyms or antonyms)

CUSP CPD to elaborate - August 2022

HOW IT CAN BE USED

EXPLICIT INSTRUCTION
Vocabulary scripting

VOCABULARY QUIZ

Select specific questions ranging in breadth and depth.

OWN-it	Analyse	KNOW-it	Definition
Tick the <i>root</i> word that means a <i>small bit</i> .	<input type="checkbox"/> chunk <input type="checkbox"/> part	Explain the meaning of the word <i>solid</i> .	
Explain the meaning of the underlined <i>prefix</i> in the word <i>reverse</i> .		True or false? The word <i>gas</i> means a substance that is neither a liquid nor a solid.	
Which part of the word <i>evaporation</i> means <i>turn from a liquid into a vapour</i> ?		Tick one. The word <i>vapour</i> means:	<input type="checkbox"/> small drops of liquid in the air <input type="checkbox"/> a small puddle
LINK-it	Connect	USE-it	Use in context
Circle the word closest in meaning to <i>permanent</i> .	always sometimes	Correct or incorrect use? When it got hotter, the liquid began to <i>melt</i> .	<input type="checkbox"/> Correct <input type="checkbox"/> Incorrect
Write a word meaning the opposite of <i>evaporate</i> .		Insert a word that would complete this sentence correctly. Materials can change _____ by heating or cooling them.	
Write two words associated with <i>matter</i> .	1. 2.	Use the word <i>liquid</i> correctly in a sentence.	

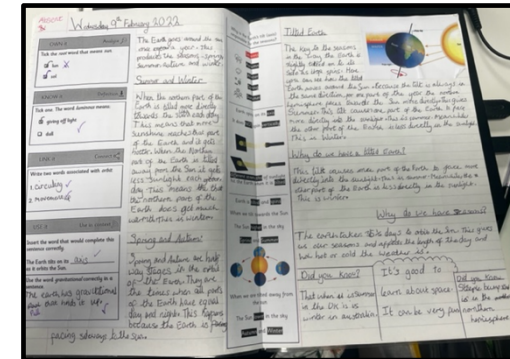
CUSPA Curriculum with Unity Schools Partnership

KNOW-it = define and decode

USE-it = use in context

LINK-it = connect to wider knowledge

OWN-it = Analyse and unwrap the meaning of words

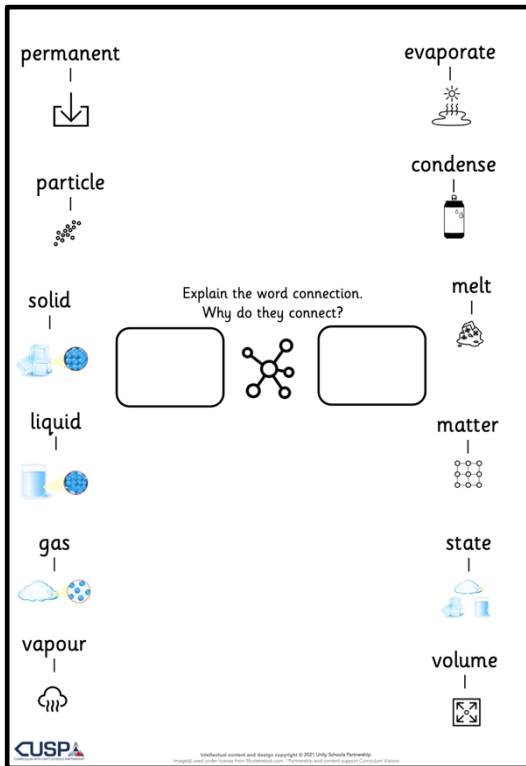


HOW IT CAN BE USED

RETRIEVAL PRACTICE
SPACED RETRIEVAL PRACTICE
Analysis of how well pupils know, can use and apply vocabulary.

WORD CONNECTION

Connect words and use in context.



Model to pupils and use as a worked example to begin with.
My Turn – I choose **solid**.

A word that I would connect to that would be **melt**.

"The solid matter of butter began to melt as the temperature rose above 32° C."

What words will you connect? Why is that?

HOW IT CAN BE USED

Use within lesson phases – Connect to revisit known words and make conscious connections to new ones.

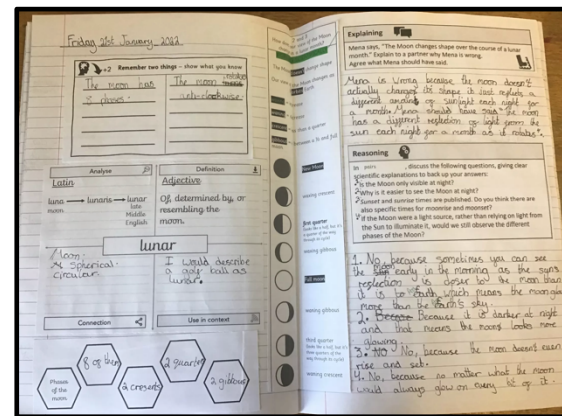
Explain, Example, Attempt and Apply phases – oracy and explanations.
Challenge phase for pupils to link, connect and explain three or more words.

VOCABULARY MATRIX

Connect words and use in context.



Used to model and develop coherent vocabulary understanding through the multi-faceted vocabulary instruction evidenced by Cain and Oakhill.



HOW IT CAN BE USED

Worked examples are elaborated from the define and decode stage, allowing for guided and independent use of the vocabulary.

Definition, context, wider connections and analysis of the word is threaded through the study.

CUSP SCIENCE Handbook

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9. PLANNING

with the 6 phases of a lesson

Routines matter

Peps Mccrea helps us understand this through the below diagram:

ROUTINES

Routines (well trodden paths) help children attend to the content

Distribution of attention

Not a routine → Embedded routine

pepsmccrea.com/diagrams Source: Mccrea (2020) Motivated Teaching

Routines bring about consistency, so that children become a little more expert.

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CUSP Thinking hard routines support coherent formation of long-term memory:

Thinking hard routines

Questioning

Teacher book

Double page spread

Chunking

Vocabulary instruction

Sequencing

Word path

Word connection

Explain the word connection

Two things

Sentence stems

Image cues

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Avoid lesson fade: use our cumulative tasks (Teach – Task – Teach – Task) model

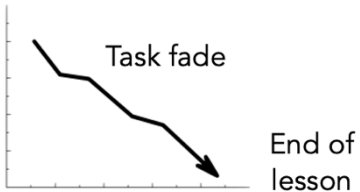
It is much more effective than a huge dollop of information and instructions that overload the working memory.



Too much information through 100s of slides without clear explanation and a focus on vocabulary will disengage pupils and bring about task fade.


Give **structure** to help children **attend** to their learning

Dollop of teaching

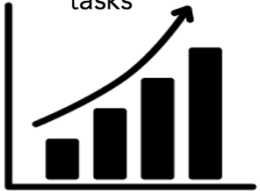


Task fade


End of lesson




Cumulative tasks



Systematic and structured teaching



The Teach-Task cumulative sequence that draws on the six phases of a lesson supports coherent and effective creation of long-term memory.



CUSPA CUSP Spotlight CPD – Generative Learning Practice © Copyright 2021 Unity Schools Partnership 3

Headlines for 6 phases of a lesson



Connect	Explain	Example	Attempt	Apply	Challenge
Retrieval	Instruction		Deliberate practice	Guided or independent practice	Integrate
Connect prior learning	My Turn	Worked examples	Our turn	Your turn	Sophisticate through retrieval, explanation,
Connect to concept and Big Idea	Explicit vocabulary instruction	Full or partially completed diagrams	Allows for misconceptions to be identified		Sophistication through self-questioning
Position learning within KO			Feedback given at the point of learning		Summarise using 'I know and I think' statements

Elaboration and detail for 6 phases of a lesson



Connect



Explain



Example



Attempt



Apply



Challenge

<p>Make Connections with previous learning through questions, quizzes, two things, give one and get one routines.</p> <p>Position and frame substantive concepts in context of this learning using Big Ideas map.</p> <p>For example, the concept of LIGHT connects to the SCIENCE domain of PHYSICS and the importance of understanding that LIGHT is made of waves that help us communicate.</p>	<p>Focus the learning question to help pupils attend.</p> <p>Introduce essential vocabulary in the context of the lesson.</p> <p>Use vocabulary modules and scripts to introduce new words.</p> <p>Be efficient with words and clear with explanations.</p> <p>RECEPTIVE LANGUAGE DEVELOPMENT</p>	<p>Make worked examples really explicit.</p> <p>Use diagrams, images, videos, artefacts to help articulate the content.</p> <p>Reduce number of slides on interactive boards.</p> <p>Use My Turn boards to capture the core content by writing on flip chart paper and hanging it up.</p>	<p>USE WHAT YOU KNOW</p> <p>Pupils practically have a go at selecting and organising the content you have taught them.</p> <p>DELIBERATE PRACTICE</p> <p>Develop receptive and expressive language. This enables pupils to rehearse and make sense of the learning.</p> <p>FEEDBACK – a great opportunity to Diagnose, Intervene and Evaluate (Hattie) the learning taking place.</p>	<p>SHOW WHAT YOU KNOW</p> <p>Use teacher books to model page layout using double page spreads.</p> <p>Use CUSP Thinking Hard routines to help pupils explain and connect their learning.</p> <p>Use and apply vocabulary all the time. Make it unmissable and irresistible.</p> <p>Increase productivity through CUSP Hexagon pathways to explain content.</p>	<p>DEEPEN WHAT YOU KNOW</p> <p>Quizzes to increase the retrieval practice effect.</p> <p>Self-questions to develop richer knowledge of the content.</p> <p>Two things</p> <p>Blank hexagon pathways</p> <p>Open word paths</p> <p>Partial word paths</p> <p>Closed word paths</p>
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Born and refined from CUSP Reading, the 6 phases of a lesson give evidence-led structure to teaching and learning. A lesson may have multiple parts to it. It may not be linear. You can introduce the dynamic phases of attempt into multiple phases.

Example planning

Our talented CUSP Associate Consultants (teachers and leaders in Unity Schools Partnership schools) have been busy writing exemplar modules over the summer holiday. They are examples of how you could plan and think about the tasks, lesson by lesson. They are **an** example, not **the** example. They can be found on a new page: CUSP Core > Example Planning

Find it here: <https://www.unity-curriculum.co.uk/example-planning/>

Year 1 Science
|
Animals, including humans

1 / 17

Year 1 Science
Animals, including humans
Carrie Kinsella and Alex Bedford

1

2

BIOLOGY
Animals, including humans

Animals Eating Senses

What is an animal? What types of animals are there? What is similar and what is different? What does food tell us about an animal? What makes me an animal? What senses do I have?

SCIENCE Animals, including humans Year 1
High school for depth to
7. Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals.
8. Identify and name a variety of common animals that are carnivores, herbivores and omnivores.
Practical lessons: The Natural World

Y1 Animals, including humans AB edit [Download](#)

Key Stage 1 example from Carrie Kinsella (KS1 CUSP Associate Consultant) and Alex Bedford

Year 1 Animals, including humans

Lessons can follow this sequence, but it's never set in stone.

- REMEMBER (retrieval task)
- Task 1 EXPLAIN, ATTEMPT, APPLY
- Task 2 EXPLAIN, ATTEMPT, APPLY
- COMBINE and CHALLENGE

Planning using the 6 phases of a lesson

Science: What is an animal?	CONNECT	EXPLAIN and EXAMPLE	ATTEMPT	APPLY	CHALLENGE
Vocabulary					
<p>What is an animal?</p> <p>Animals:</p> <ul style="list-style-type: none"> ✓ move freely ✓ eat other living things ✓ need water <p>An animal...</p> <ul style="list-style-type: none"> X is not a plant. X does not make food from the sun. X is not rooted to the ground. <p>Does it move freely?</p> <p>Does it eat other living things?</p> <p>Does it need water?</p> <p>Does it have roots?</p>	<p>Remember</p> <p>What are the parts of a plant? Draw and label. For those children that are unable to label they can simply draw and verbally tell an adult the parts of a plant. Children can use back to refer to prior learning and aid in spelling.</p>	<p>Show different parts of animals. (Use images from the CUSP unit) What do they all have in common? (They are all animals) Watch a video of animals in action. https://www.youtube.com/watch?v=blJw2yPusak What are the animals doing? (Moving, eating, drinking) Refer back to the knowledge note to explain that all animals move freely, eat other living things and need water. Establish that humans are animals too.</p>	<p>①</p> <p>In pairs, look at three animals from different groups e.g. dog, fish, blackbird and establish how they move, what they eat and whether they need water. Collect ideas as a class.</p> <p>②</p> <p>Give the children pictures of plants and animals. In pairs, they sort them. Do not initially tell the children how to sort them, just that it needs to be into two groups. Ask how they have sorted them and establish that they could be sorted into animals and plants.</p>	<p>Use the attempt task to write/complete four sentences.</p> <p>A <u>dog</u> is an animal. A <u>dog</u> <u>runs</u>. A <u>dog</u> <u>eats</u> <u>meat</u>. A <u>dog</u> <u>needs</u> <u>water</u> <u>to drink</u>.</p> <p>The children then draw/stick in a picture of the animal they have chosen.</p> <p>In hexagons, children independently draw what an animal is not. Label if can with the use of the knowledge note.</p>	<p>Combine</p> <p>Questioning – Thinking task</p> <p>Provide the children with some images of unusual animals. If you were allowed to pose only one question about it, what would it be? Focus on movement and food.</p>
Common misconceptions	Humans are not animals, we are people.	Humans are mammals and are part of the animals kingdom.			

What the page and tasks could look like

Lesson 1 Page Example

What is an animal?

Animals:

- ✓ move freely
- ✓ eat other living things
- ✓ need water

An animal...

- X is ~~not~~ a plant.
- X ~~does not~~ make food from the sun.
- X is ~~not~~ rooted to the ground.

Does it move freely?

Does it eat other living things?

Does it need water?

Does it have roots?

Plants

flower

leaves

roots

stem

A dog is an animal.

A dog runs.

A dog eats meat.

A dog needs water to drink

An animal

is not a plant

does not make food from the sun

has no roots

Challenge:
Do your spikes make it difficult to move?

Example planning and page layout will be written by Alex Bedford and the CUSP Associate Consultants for a selection of CUSP Science, Geography and History Modules.

Key Stage 2 example from Tom Wade (KS2 CUSP Associate Consultant) and Alex Bedford


Year 6 Living things and their habitats

Lessons can follow this sequence, but it's never set in stone.

- REMEMBER (retrieval task)
- Task 1 EXPLAIN, ATTEMPT, APPLY
- Task 2 EXPLAIN, ATTEMPT, APPLY
- Task 3 EXPLAIN, ATTEMPT, APPLY
- COMBINE and CHALLENGE


Planning using the 6 phases of a lesson

What the page and tasks could look like

Science: Who was the scientist Carl Linnaeus and what did he do?	CONNECT	EXPLAIN and EXAMPLE	ATTEMPT	APPLY	CHALLENGE
Vocabulary →	taxonomy, classification				Combine
<p>1. Who was the scientist Carl Linnaeus and what did he do?</p>  <p>Carl Linnaeus created the taxonomy system to organize living things from about 1737 before this time the way plants and animals were organized was very complicated.</p> <p>taxonomy = arrange method</p> <p>Linnaeus classification</p> <p>looked at natural things to decide if they were related</p> <p>KINGDOM (e.g. Animal, Plant, Fungi, Bacteria, Algae)</p> <p>PHYLUM (e.g. Vertebrate, Mollusc, Arthropod)</p> <p>CLASS (e.g. mammal, reptile, and fish)</p> <p>divided them into subgroups</p> <p>Linnaeus later inspired Charles Darwin to study his theory of evolution through observations in the field (environment)</p>	<p>Remember</p> <p>Show pupils an image of Carl Linnaeus (1707-1778) (Use images from CUSP Unit and refer to him on KS). Explain to pupils that Linnaeus was a famous Swedish scientist. Show children on a map where Sweden is (country in NE Europe).</p> <p>We are going to become a little more expert about Living Things and their habitats. Carl Linnaeus was a scientist and studied a part of science we call biology. Studying Living things will help us know more about biology.</p> <p>Use a vocabulary script to explain: Carl Linnaeus created the taxonomy system in 1737. Taxonomy – that's an interesting work. I'm going to teach you what it means. My turn – taxonomy. Our turn – taxonomy. Taxonomy means taxonomy = arrange method</p> <p>Taxonomy helps us arrange and classify living things in an order, so everyone follows the same system.</p>	<p>1</p> <p>Verbally explain to others about Carl Linnaeus and what he created. Expect pronunciation to be precise.</p> <p>Unwrap the word and explain what it means to your partner. Write it down, so you remember.</p>	<p>2</p> <p>Pupils attempt using partially completed examples to begin with.</p> <p>reduce the support as pupils become more familiar with the system,</p> <p>https://www.thoughtco.com/animal-profiles-by-scientific-name-127447</p>	<p>3</p> <p>Use shapes to help clarify classification and explain the levels.</p>	<p>Use a hexagon pathway to revisit the lesson question to retrieve / elaborate on Who was Carl Linnaeus and what did he do?</p> <p>Pupils choose to explain and go further, drawing upon what they know.</p>
Common misconceptions			Animal and plant names have existed.		
CUSP AC Planning				© Copyright 2022 Unity Schools Partnership	

Lesson 1 Page Example

1. Who was the scientist **Carl Linnaeus** and what did he do?



Carl Linnaeus created the **taxonomy** system to organize living things from about **1737** before this time the way plants and animals were organized was **very complicated**.

taxonomy = arrange method

Linnaeus classification

looked at natural things to decide if they were related

KINGDOM (e.g. Animal, Plant, Fungi, Bacteria, Algae)

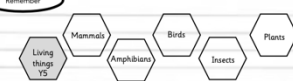
PHYLUM (e.g. Vertebrate, Mollusc, Arthropod)

CLASS (e.g. mammal, reptile, and fish)

divided them into subgroups

Linnaeus later inspired Charles Darwin to study his theory of evolution through observations in the field (environment)

Remember



Carl Linnaeus created the **taxonomy** system to organize living things from about **1737** before this time the way plants and animals were organized was **very complicated**.

taxonomy = arrange method

Linnaeus classification

looked at natural things to decide if they were related

KINGDOM (e.g. Animal, Plant, Fungi, Bacteria, Algae)

PHYLUM (e.g. Vertebrate, Mollusc, Arthropod)

CLASS (e.g. mammal, reptile, and fish)

divided them into subgroups

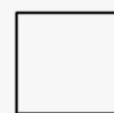
Linnaeus later inspired Charles Darwin to study his theory of evolution through observations in the field (environment)

Common Pipistrellus (Bat)

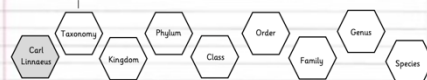
Kingdom – Vespertilionidae (Micro-bats)
 Phylum – Pipistrellus
 Class – Pipistrellus pipistrellus
 Order – **Chiroptera (Greek for hand-wing)**
 Family – Chordata (vertebrate)
 Genus – Mammalia (mammal)
 Species – Animalia (animal)

Shape - square

Number of sides – four
 Lines of symmetry – four
 Number of vertices – four
 Family – Quadrilateral
 Internal angles – 360 degrees
 Number of edges – four
 Type – regular polygon



Arrange using a method



Tells you which of the 5 major kingdoms the living thing is in.

Kingdom – animal
 Phylum – vertebrate (Chordata)
 Class – mammal
 Order – mammal
 Family – large cat
 Genus – panthera
 Species - lion

Kingdom – animal
 Phylum – vertebrate (Chordata)
 Class – mammal
 Order – mammal
 Family – mammal
 Genus – mammal
 Species - lion

CUSP AC Planning

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Example planning and page layout will be written by Alex Bedford and the CUSP Associate Consultants for a selection of CUSP Science, Geography and History Module.

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10. REASONABLE ADJUSTMENT: INCLUSION AND SEND

Please also see the CUSP SEND guidance for more information that Fran Brown and I put together in early 2022

<https://www.unity-curriculum.co.uk/send/>

"Central to this debate (what inclusive education looks like) should be the rights of the child as a learner. How do we design learning environments and learning activities that will ensure that each child is an active participant in the learning process and not a bystander, a peripheral participant, watching the activity of others? How can we support families, teachers and professionals to include those learners in all aspects of the curriculum to achieve this goal?"

Barry Carpenter, Enabling Access

We believe that the CUSP curriculum architecture, that is built around retrieval practice and spaced retrieval practice, combined with evidenced teaching and generative learning tasks that are appropriately scaffolded are essential components in answering Barry’s question.



Support staff play a vital role in universal quality first teaching. The principles of instruction, vocabulary teaching and generative learning tasks are universal in a school. All staff should be using and deploying these research-facing strategies.

1) Universal Quality First Teaching (embedded within all classrooms) Teacher / Subject Leads / Curriculum / LA's									
Structured, pre-planned and prepared sequence of lessons. CUSP resources and Learning Questions	Positive, high expectations, and aspirations for all. Specific praise and reward Behaviour Policy / Classroom Routine	Explicit Vocab teaching and choice of language. Knowledge organisers, vocabulary mats / strips, dual coding	Explicit Modelling and demonstration My turn Our turn Your turn working walls	Clear chunked instructions supported with visuals / actions	Multi-sensory activities manipulatives	Review, repeat, recall, retrieve Do now	Frequent checking of understanding retrieval practice cumulative quizzing	Flexible groupings Talk partners, LA or teacher working with specific groups	Accurate and continued assessment constructive and instant feedback at the point of learning







EDITABLE KNOWLEDGE NOTES

Enabling you to make **REASONABLE ADJUSTMENT** for pupils with SEND / EHCP to help make sense of the content.

How are rocks formed?	
made from cooled molten rock - lava or magma	
igneous	
rock that is so hot it becomes liquid	
molten rock	
lava is molten rock above the earth's crust	
	
magma is molten rock under the earth's crust	
rocks are natural and not made by humans	
<u>Not a rock</u>	Yes - a rock
x concrete x brick x stone blocks	✓ boulders ✓ pebbles ✓ stones
Igneous rocks are hard:	
	basalt granite pumice obsidian
DEFINE WHAT A ROCK IS	
TEST HARDNESS OF ROCKS	

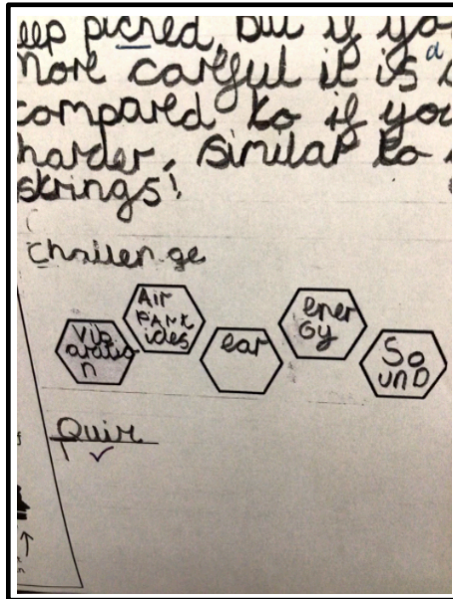
Edited and reasonable adjustment made, bespoke to the learner or learners →

How are rocks formed?	
cooled liquid rock	
igneous rock	
hot liquid rock	
molten rock	
lava is molten rock above the earth's crust	
	
magma is molten rock under the earth's crust	
rocks are natural and not made by humans	
<u>Not a rock</u>	Yes - a rock
x concrete x brick	✓ pebbles ✓ stones
Igneous rocks are hard:	
	basalt granite
DEFINE WHAT A ROCK IS	
TEST HARDNESS OF ROCKS	

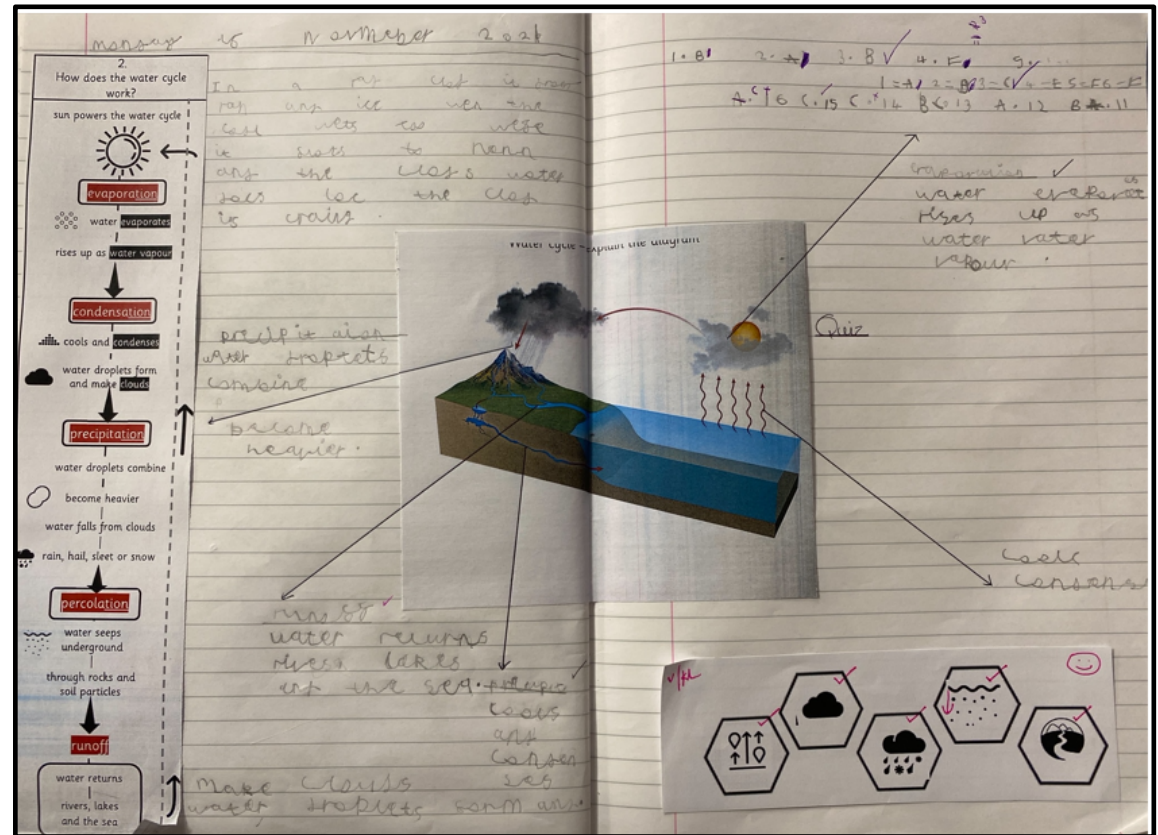
"Soon after starting CUSP, I had a child with Verbal dyspraxia and ASC (y3) stop me as I walked through school. He often stops me for a chat, but today he asked to show me his work (first time). He opened at the knowledge note (Doggerland!) and talked me through it. He said, "This helps me remember". He turned back in his book and then to the current page and said, "Look how much I have written, this helped me to learn." For him the scaffold of the knowledge note was transformational. Now that is amazing for standards, but actually more importantly how children feel about themselves, particularly as they get older. Accessing the same curriculum makes them feel they belongis about equity for me!"

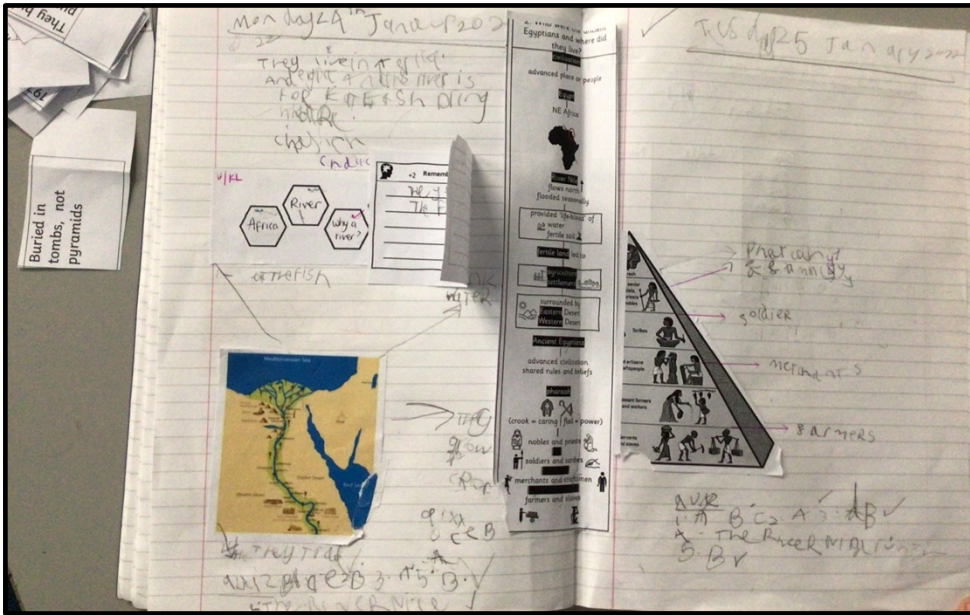
Marie Beale, Deputy Head and Inclusion Manager
Whitefield Primary School, Liverpool

Oral Rehearsal: Allows pupils to formulate and practice responses before recording or writing these down.

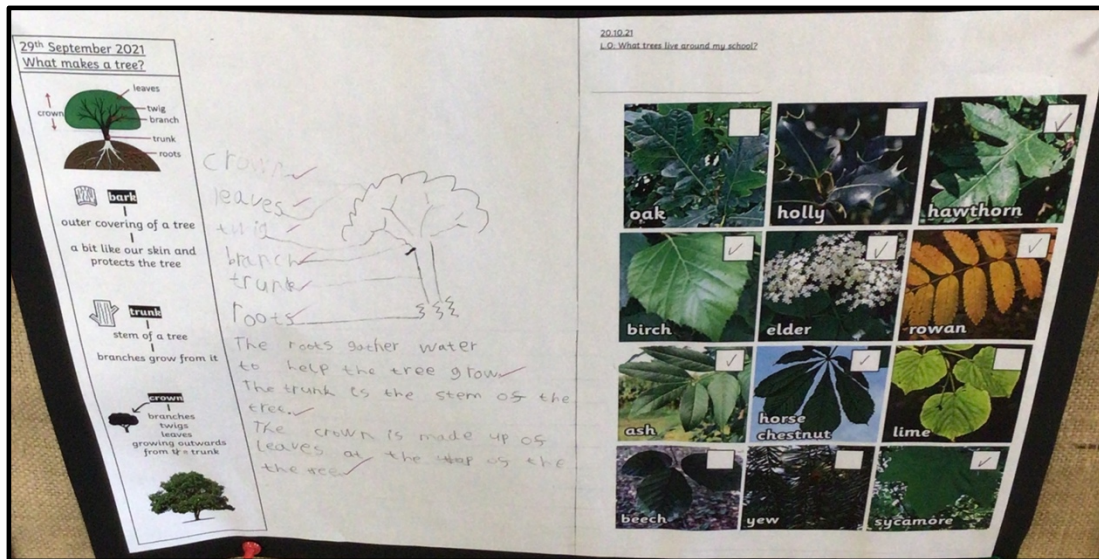
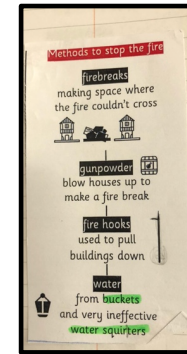


Pathways: Enable pupils to record and verbally share their knowledge and understanding, removing the pressure of extended writing.





- Chunk Knowledge Notes into manageable sections
- Highlight key vocabulary
- Dual coding
- Annotation



- Alternative ways of recording
- Teachers knowing and adapting to meet their learners' needs
- Targeting additional input to lower attaining pupils and those with SEND

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11. DIGITAL RESOURCES

We recommend signing up to  for schools to support teacher knowledge and teaching of the National Curriculum. It's **FREE!**



FREE SIGN UP

SIGN IN

A partnership between
 | 

Teach the primary science curriculum with confidence
Free online CPD, developed with Imperial College London

Mapped to curricula for England, Scotland, Wales and Northern Ireland

[Sign me up - help me teach science](#) >

[Already signed-up? Sign in here](#)



"We need to inspire teachers as much as pupils"
[Read Professor Robert Winston's Message](#)

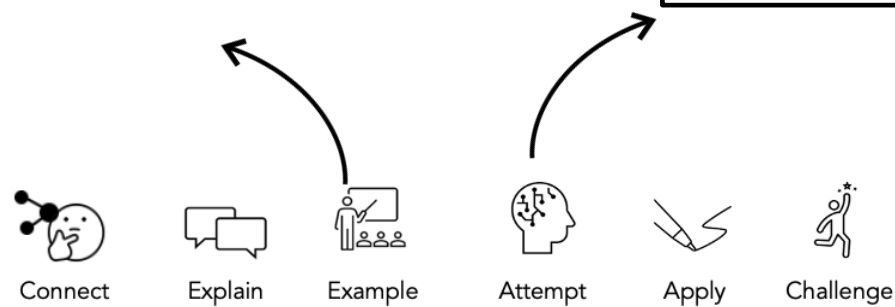
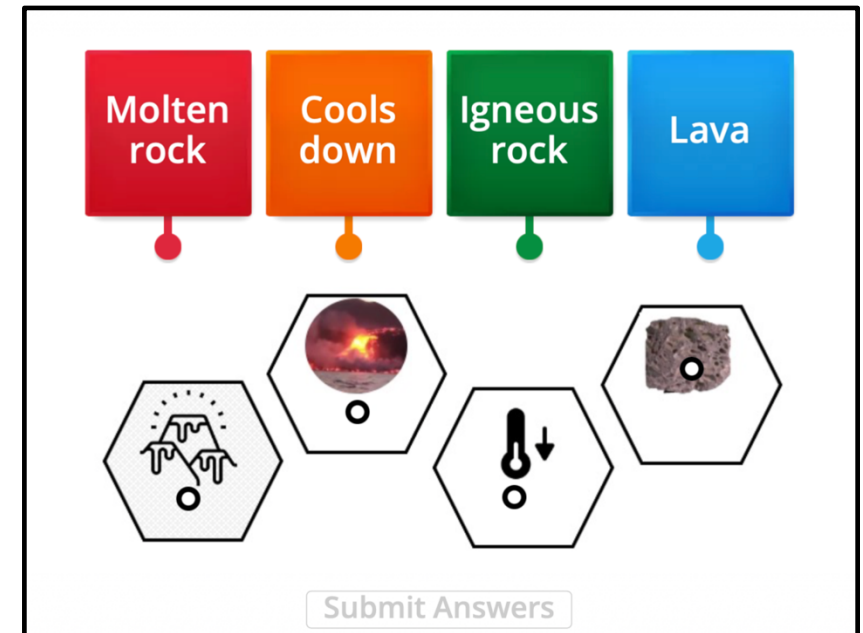


Bite-sized online CPD
Complete a unit in just 20 minutes.
[Show courses](#)




For parents
Fun activities to do at home.
[Read more](#)

We also recommend subscribing to  **Wordwall** to support deliberate practice, task design, and our Teach – Task – Teach - Task model.



You can subscribe to **socrative** as a digital method to support retrieval practice and spaced retrieval practice (Y2 – Y6)




Click on the link below to import this quiz to your Socrative account

<https://b.socrative.com/teacher/#import-quiz/41758797>

Cumulative quiz

It's most effective if you use these questions through cumulative quizzing

Lesson by lesson
Teach | Test | Teach | Test | Teach | Test | Test










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Launch Quiz

1 Choose Quiz Yr 2 Science Living things and their habitats [Change](#)

2 Choose Delivery Method and Settings Step 2 of 2

	Instant Feedback 	<input type="checkbox"/> Require Names
	Open Navigation 	<input type="checkbox"/> Shuffle Questions
	Teacher Paced 	<input type="checkbox"/> Shuffle Answers
		<input type="checkbox"/> Show Question Feedback
		<input type="checkbox"/> Show Final Score
		<input type="checkbox"/> One Attempt 

[Previous](#) [Start](#)

Yr 2 Science Living things and their habitats

< 1 of 17 >

1. Tick the features common to all living things.
(CHOOSE 7)

[Show Results](#) 0/0 Students Answered

- A Movement.
- B Respiration.
- C Sensitivity.
- D Growth.
- E Reproduction.
- F Excretion.
- G Nutrition.
- H Sunlight.
- I Rocks.

- The FREE account allows you 5 quizzes to run at once.
- Download the CUSP quiz using or copying the link on the Cumulative Quiz page.
- To begin, we recommend teacher-paced delivery method with clear modelling of how to answer the questions.
- Export the pupil responses to keep as record enabling you to feed forward the information.

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12. ASSESSMENT

Assessment is both formative and at the point of learning as well as summative to feed forward to the next point of contact pupils will have. Recording of assessment is multi-faceted. We support whole class feedback and marking principles. Any notes made must be useful and insightful, not lengthy or cumbersome.

In short, assessment can be complex. William, Hattie, Didau, the EEF and many others have grappled with the purpose, structure and ultimate aim that teacher feedback impacts on pupil learning.

All the evidence points towards feedback being most impactful as near to the point of learning as possible. That is why the 6 phases of a lesson allow teachers the space to listen, watch and interact to intelligently give feedback at the point of learning.

In summary, feedback should pay attention to these three questions:

1. Does feedback provide **CLARIFICATION**?

Are pupils on the right track? If they are not, do they know how to improve?

2. Does feedback provide **SOPHISTICATION**?

Do pupils get the opportunity to elaborate and respond to challenges, regardless of starting points?

3. Does feedback **MOTIVATE**?

Do pupils recognise and act upon the feedback through verbal comments and marks that teachers and support staff make? Do they see themselves as part of the learning process, rather than just being done to?

Making notes of these iterations is never at the expense of quality teaching. Teachers and support staff can summarise notes about the lesson, who stood out, who needed support can be brief and simple.

Feedback, quizzes, thinking hard tasks and structured assessment tasks all contribute towards the bigger picture of how well pupils retain and remember the content.

The feedback and assessment forms over the page are used as a tool to quickly summarise and capture the learning, lesson to lesson. They are not designed to be fully comprehensive, but as a formative tool to capture and record, so that information can be fed forward to provide insights into the next lesson or summarised at the end of a study.

Thinking Science tasks enable teachers to target specific skills for assessment, either for the whole cohort or specific groups.

ASSESSMENT CPD


In the CUSP Science CPD library there is a specific video on using assessment for impact.

Spelling Reading & Writing Science Art & Design Design and Technology French Geography History Music CUSP Core Vocabulary Contact Us

About CUSP Science

Science CPD Library

Year 1
Year 2
Year 3
Year 4
Year 5
Year 6



Science CPD Library

Where professional growth enables teachers to realise the potential of excellence.

Click on the links in the drop down box below to access brilliant CUSP Science CPD led by the wonderful Pip Headlam (who loves the CUSP modules!)

Press + to reveal the CUSP Science CPD Library

1. CUSP Science
2. CUSP Working Scientifically
3. Minimum expectations in practice
4. CUSP Assessment in Science for impact
5. Basic subject knowledge in biology, chemistry and physics
6. Creating Curious Learners
7. Developing Oracy through Science


2016 Science Sampling Commentary Booklet
2016_sciencesamplepublicrelease_Commentary_Booklet_V9

NEW - CUSP Thinking Science Notes Guidance


Science CPD Session 4

Assessment in Science for impact

Pip Headlam


CURRICULUM WITH UNITY SCHOOLS PARTNERSHIP

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In conjunction with 

PUPIL BOOK STUDY

An highly acclaimed and evidence-led evaluation of long-term learning through precise and structured conversations.

Originally created and published by Alex Bedford, we have now added a subject specific book - Pupil Book Study: Reading. The original principles and practice of Pupil Book Study have been applied, through the expert knowledge of Lauren Meadows, to Reading. Writing and maths are to follow.

Pupil Book Study aims to help subject leaders and school leaders answer these three questions:

1. What impact is your **CURRICULUM** having?

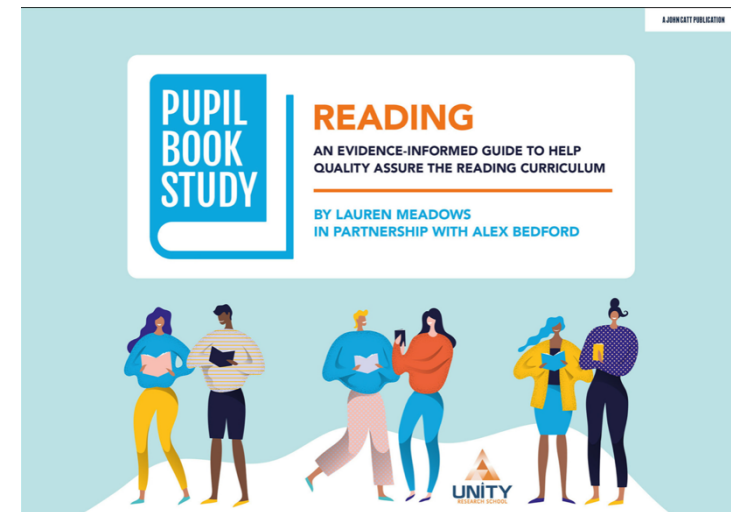
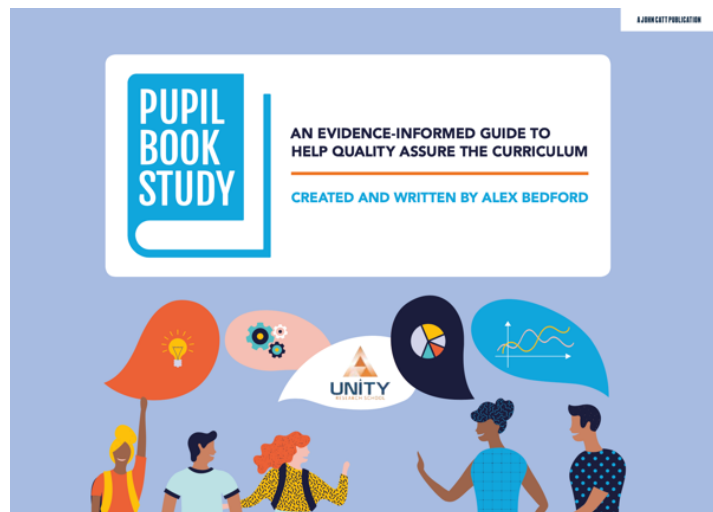
What effect is the curriculum architecture having?

2. Does teaching support **LONG-TERM LEARNING**?

Is the evidence-led practice really being deployed at a classroom level, or is it superficial?

3. Do tasks enable pupils to **THINK HARD** and **CREATE LONG-TERM MEMORY**?

How impactful are tasks, and do they help pupils to think hard and generate learning?



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13. PROGRESSION AND SEQUENCE

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Study module by study module from Year 1 – Year 6
Includes Tier 2 and Tier 3 vocabulary reference


PURPOSE

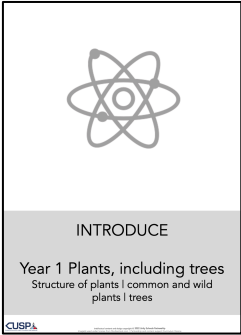
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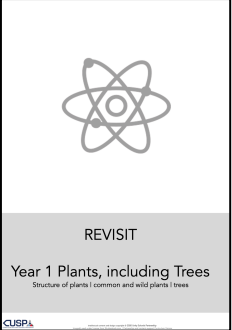
REFERENCE: teachers can clearly see the cumulative nature of the curriculum model as well as a quick point of reference to connect prior learning.

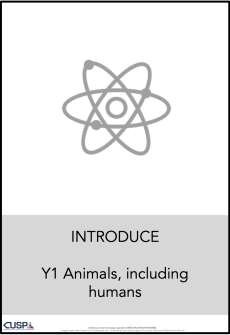
QUALITY ASSURANCE: subject leaders know the substantive concepts, knowledge and vocabulary that pupils should remember and use when running Pupil Book Study.

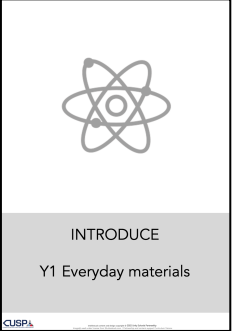
CUSP Geography Progression Tables – Keeley Alborough and Alex Bedford

Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y1 Seasons and weather Day and night</p> <p> </p>  <p>INTRODUCE</p> <p>Y1 Changes Seasons and weather Day and night</p> <p>CUSP</p>	<p>Physics*</p> <p> </p> <p>The study of energy forces mechanics waves structure of atoms physical universe</p> <p> </p> <p>Earth in Space</p> <p>*Adapted from BBC Bitesize</p>	<p>Managing Self Manage their own basic hygiene and personal needs, including dressing, going to the toilet, and understanding the importance of healthy food choices.</p> <p>The Natural World Explore the natural world around them, making observations and drawing pictures of animals and plants.</p> <p>Explore the natural world around them, making observations and drawing pictures of animals and plants.</p> <p>Understanding some important processes and changes in the natural world around them, including seasons and changing states of matter.</p>	<p>Seasons and weather What are the four seasons?</p> <p>What's the weather like in Autumn, Winter, Spring and Summer?</p> <p>Day to night Why does day become night?</p>	<p>dawn dusk mild rotate soaked weather</p>	<p>month season spring summer autumn winter</p>


Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y1 Plants, including trees </p> 	<p>Biology The study of living things, including</p> <p>Common plants and trees in a local environment</p>	<p>Managing Self Manage their own basic hygiene and personal needs, including dressing, going to the toilet, and understanding the importance of healthy food choices.</p> <p>The Natural World Explore the natural world around them, making observations and drawing pictures of animals and plants. Explore the natural world around them, making observations and drawing pictures of animals and plants. Understanding some important processes and changes in the natural world around them, including seasons and changing states of matter.</p>	<p>Structure of plants What are the parts of a plant?</p> <p>Wild and common plants What are wild plants and where do you find them? What are garden plants and where do you find them?</p> <p>Trees What makes a tree? What types of tree are there? (Trees that live around my school) What's the difference between trees?</p>	<p>bud trunk branch bark seed wild</p>	<p>nutrients stem deciduous evergreen</p>


Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y1 REVISIT Plants, including trees MODULAR SEQUENCE</p> 	<p>Biology The study of living things, including</p> <p>Common plants and trees in a local environment</p>	<p>Managing Self Manage their own basic hygiene and personal needs, including dressing, going to the toilet, and understanding the importance of healthy food choices.</p> <p>The Natural World Explore the natural world around them, making observations and drawing pictures of animals and plants. Explore the natural world around them, making observations and drawing pictures of animals and plants. Understanding some important processes and changes in the natural world around them, including seasons and changing states of matter.</p>	<p>Structure of plants What are the parts of a plant?</p> <p>Wild and common plants What are wild plants and where do you find them? What are garden plants and where do you find them?</p> <p>Trees What makes a tree? What types of tree are there? (Trees that live around my school). What's the difference between trees?</p>	<p>bud trunk branch bark seed wild</p>	<p>nutrients stem deciduous evergreen</p>

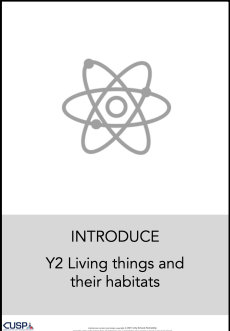
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y1 Animals, including humans I</p> 	<p>Biology I The study of living things, including</p> <p>Types of animals Food animals eat Senses</p>	<p>Managing Self Manage their own basic hygiene and personal needs, including dressing, going to the toilet, and understanding the importance of healthy food choices.</p> <p>The Natural World Explore the natural world around them, making observations and drawing pictures of animals and plants. Explore the natural world around them, making observations and drawing pictures of animals and plants. Understanding some important processes and changes in the natural world around them, including seasons and changing states of matter.</p>	<p>Animals What is an animal? What types of animals are there? What is similar and what is different?</p> <p>Eating What does food tell us about an animal?</p> <p>Senses What makes me an animal? What senses do I have?</p>	<p>blood senses young feathers fur scales</p>	<p>mammal amphibian reptile herbivore carnivore omnivore</p>

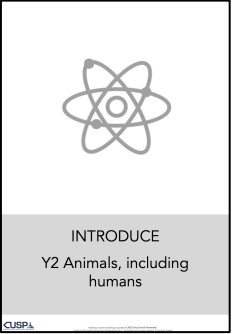
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y1 Everyday materials </p> 	<p>Chemistry* the study of the composition, behaviour and properties of matter</p>	<p>Managing Self Manage their own basic hygiene and personal needs, including dressing, going to the toilet, and understanding the importance of healthy food choices.</p> <p>The Natural World Explore the natural world around them, making observations and drawing pictures of animals and plants. Explore the natural world around them, making observations and drawing pictures of animals and plants. Understanding some important processes and changes in the natural world around them, including seasons and changing states of matter.</p>	<p>Materials What are materials? What are things made of in school?</p> <p>Properties How can I describe materials? Which materials are waterproof and which are not? Which materials are transparent and which are opaque?</p> <p>Use what you know What's the best material for the job? Why?</p>	<p>absorb rough smooth waterproof metal plastic</p>	<p>materials properties flexible transparent opaque physical</p>

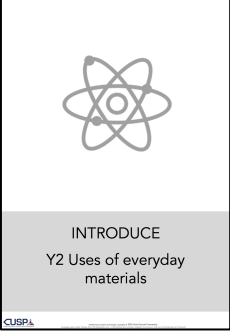
*Adapted from BBC Bitesize

Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y1 REVISIT Animals, including humans </p>  <p>REVISIT Y1 Animals, including humans</p>	<p>Biology The study of living things, including</p> <p>Types of animals Food animals eat Senses we have</p>	<p>Y1 Animals including humans</p>	<p>Revisit and name it What features do animals have? Use the cues and single words in knowledge note to focus on vocabulary. Consolidate by talking and writing sentences on the page next to the knowledge note.</p> <p>Describe it Retrieve and complete labels on the knowledge organiser. What are the features of the animal group? Go further by writing sentences or drawing diagrams on the page next to it.</p> <p>Describe it Continue to describe the features of each animal group. Go further by writing sentences / draw diagrams on the page next to it.</p> <p>Sort it Compare animal groups – what do you notice is similar and what is different? Go further by writing sentences / draw diagrams on the page next to it.</p>	<p>blood senses young feathers fur scales</p>	<p>mammal amphibian reptile herbivore carnivore omnivore</p>


Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y1 SECOND REVISIT Plants and Animals, including humans </p>  <p>Second Revisit Year 1 Plants and Animals, including humans</p>	<p>Biology The study of living things, including</p> <p>Types of animals Food animals eat Senses we have</p>	<p>Y1 Animals including humans</p>	<p>Remember it Animals, including humans</p> <p>Elaborate it Animals, including humans</p>	<p>blood senses young feathers fur scales</p>	<p>mammal amphibian reptile herbivore carnivore omnivore</p>
	<p>Common plants and trees in a local environment</p>	<p>Y1 Plants</p>	<p>Remember it Plants</p>	<p>bud trunk branch bark seed wild</p>	<p>nutrients stem deciduous evergreen</p>

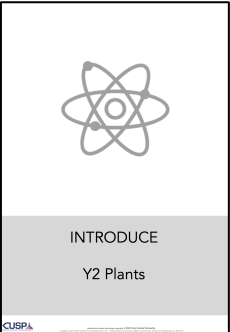
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y2 Living things and their habitats I</p> 	<p>Biology I The study of living things, including</p> <p>Characteristics of living things</p> <p>Relationship of living things and their environment.</p>	<p>EYFS – Natural Word</p> <p>Y1 Plants</p> <p>Y1 Animals including humans</p> <p>Y1 Revisit Animals, including humans</p> <p>Y1 Second revisit of Animals, including human and plants</p>	<p>Characteristics of living things What is alive and what is not?</p> <p>What do all living things have in common?</p> <p>Location of living things Where do plants and animals live?</p> <p>What plants and animals live in our local environment?</p> <p>How living things are connected What are food chains? How are they connected?</p> <p>Why do plants and animals need each other?</p>	<p>thrive depend producer consume prey predator</p>	<p>oxygen nutrition respiration sensitivity reproduction excretion</p>

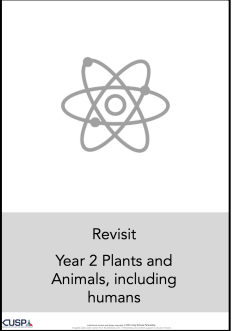
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y2 Animals, including humans I</p> 	<p>Biology The study of living things, including</p> <p>Reproduction Basic needs Diet and exercise for humans</p>	<p>EYFS – Natural Word</p> <p>Y1 Plants</p> <p>Y1 Animals including humans</p> <p>Y1 Revisit Animals, including humans</p> <p>Y1 Second revisit of Animals, including human and plants</p>	<p>Animals and change REMEMBER: what is an animal?</p> <p>How do animals change as they mature?</p> <p>Air, water and food How do we change as we mature?</p> <p>What do all animals need to stay alive?</p> <p>Health and food Keeping healthy: why do we exercise?</p> <p>Keeping healthy: why do we eat different types of food?</p>	<p>healthy survive exercise heart lungs muscles</p>	<p>hygiene larva pupa vertebrates invertebrates metamorphosis</p>

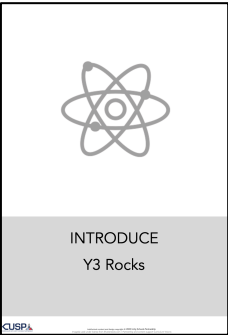
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y2 Use of everyday materials </p> 	<p>Chemistry* the study of the composition, behaviour and properties of matter</p>	<p>EYFS Natural world Y1 Everyday materials</p>	<p>Materials What are materials used for? Categorise and compare wood, metal, plastic and glass.</p> <p>What are materials used for? Categorise and compare ceramics, rock, paper and card, and fabric.</p> <p>Changes What happens when we squash, bend, twist or stretch a material?</p> <p>Purpose What's the right material for the job?</p> <p>What's the most absorbent material?</p> <p>Who invented waterproofing?</p>	<p>artificial brittle extracted fabric manufactured natural</p>	<p>ceramic durable inflexible reflective rigid translucent</p>


*Adapted from BBC Bitesize

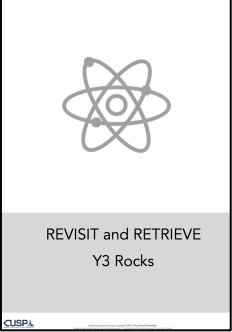
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y2 Revisit Living things and their habitats Use of everyday materials </p>  <p>REVISIT Year 2 Living things and their habitats Everyday materials CUSPA</p>	<p>Biology The study of living things, including</p> <p>Characteristics of living things</p> <p>Relationship of living things and their environment</p> <p>Chemistry* the study of the composition, behaviour properties of matter</p>	<p>Y1 Animals, including humans</p> <p>Y1 Plants</p> <p>Y2 Living things and their habitats</p> <p>Y2 Uses of everyday materials</p>	<p>Materials What is it made from?</p> <p>Characteristics of living things Compare: what is alive, what is not alive and what has never been alive?</p> <p>Apply it What materials do our pets have or need? Why is that?</p>	<p>artificial brittle extracted fabric manufactured natural</p>	<p>ceramic durable inflexible reflective rigid translucent</p>
				<p>thrive depend producer consume prey predator</p>	<p>oxygen nutrition respiration sensitivity reproduction excretion</p>

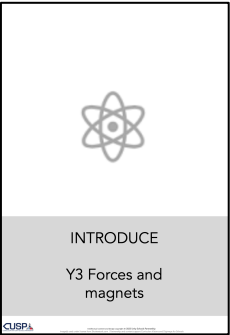
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y2 Plants I</p> 	<p>Biology The study of living things, including</p> <p>Growth Health</p> <p>Relationship of living things and their environment</p>	<p>EYFS – Natural Word</p> <p>Y1 Plants</p> <p>Y1 Animals, including humans</p> <p>Y2 Living things and their habitats</p>	<p>Growing from a seed How do seeds germinate and what happens?</p> <p>Growing from a bulb What happens when bulbs sprout?</p> <p>Healthy plants What do plants need to thrive and be healthy?</p> <p>What can happen if plants don't get the things they need?</p> <p>What do I notice about plants around the school? How are they healthy? How are they unhealthy?</p> <p>Show what you know How do seeds and bulbs grow?</p> <p>What do plants need to be healthy?</p>	<p>wither dormant mature bulb anchor sustain</p>	<p>germination perennial carbon dioxide glucose clone</p>

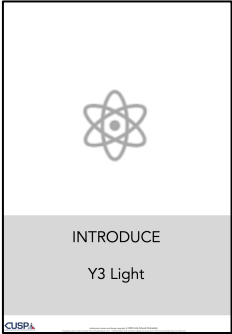
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y2 REVISIT Plants, and Animals, including humans</p> 	<p>Biology</p> <p>The study of living things, including</p> <p>Growth Health</p> <p>Relationship of living things and their environment</p> <p>Reproduction Basic needs Diet and exercise for humans</p>	<p>EYFS – Natural Word</p> <p>Y1 Plants</p> <p>Y1 Animals, including humans</p> <p>Y2 Animals, including humans</p> <p>Y2 Living things and their habitats</p> <p>Y2 Revisit Living things and their habitats</p>	<p>EXPLAIN-IT How do seeds and bulbs grow?</p> <p>SUMMARISE-IT What do I know about animals, including humans?</p> <p>INTERLEAVING and EXPLAIN-IT What do plants need to thrive and be healthy?</p>	<p>wither dormant mature bulb anchor sustain</p> <p>healthy survive exercise heart lungs muscles</p>	<p>germination perennial carbon dioxide glucose clone</p> <p>hygiene larva pupa vertebrates invertebrates metamorphosis</p>

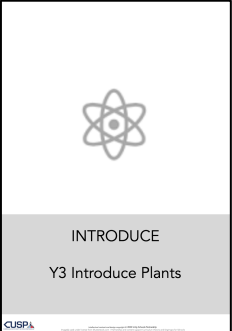
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p style="text-align: center;">Y3 Rocks I</p> 	<p>Chemistry* the study of the composition, behaviour and properties of matter</p> <p style="text-align: right; font-size: small;">*Adapted from BBC Bitesize</p>	<p>Y1 Everyday materials Y2 Use of everyday materials</p>	<p>Types How are rocks formed? What types of rocks are there?</p> <p>Change Can rocks change? How can we test a rock to see if it is limestone or chalk?</p> <p>Soil Is soil just dirt? What makes soil?</p> <p>Fossils How are fossils formed?</p> <p>Elaborate and remember rocks, soils and fossils.</p>	<p>cemented compacted decay prehistoric soil transform</p>	<p>fossil igneous magma metamorphic minerals sedimentary</p>

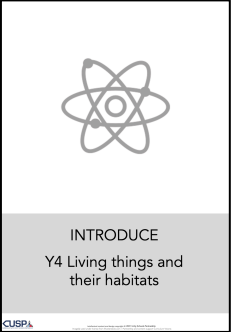
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y3 Animals, including humans</p>  <p>INTRODUCE Y3 Animals, including humans</p>	<p>Biology</p> <p>The study of living things, including</p> <p>Amount and type of nutrition</p> <p>Structure of humans and animals</p>	<p>EYFS Natural world</p> <p>Y1 Animals, including humans</p> <p>Y2 Animals, including humans</p> <p>Y2 Living things and their habitats</p>	<p>Food What effect does the food we eat have?</p> <p>Skeleton Where is my skeleton and what does it do?</p> <p>Muscle Where are my muscles and what do they do?</p>	<p>minerals skeleton skull voluntary involuntary nerves</p>	<p>biceps triceps vertebrae vitamins proteins carbohydrates</p>

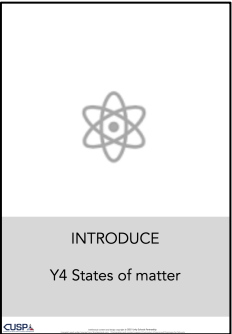
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y3 Revisit rocks </p>  <p>REVISIT and RETRIEVE Y3 Rocks</p> <p><small>CUSPA</small></p>	<p>Chemistry* the study of the composition, behaviour and properties of matter</p> <p><small>*Adapted from BBC Bitesize</small></p>	<p>Y1 Everyday materials Y2 Use of everyday materials</p>	<p>Types How are rocks formed and what types are there?</p> <p>Change Remember: how can rocks change?</p> <p>Fossils Remember: how are fossils formed and how do we know?</p>	<p>cemented compacted decay prehistoric soil transform</p>	<p>fossil igneous magma metamorphic minerals sedimentary</p>


Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y3 Forces and Magnets </p> 	<p>Physics* The study of energy forces mechanics waves structure of atoms physical universe Earth in Space</p>	<p>Y1 Seasonal changes Y1 Everyday materials Y2 Uses of everyday materials</p>	<p>Contact force and friction What are contact forces? How do surfaces affect the motion of an object? How does friction affect moving objects?</p> <p>Non-contact force What is a non-contact force? How is this different to a contact force?</p> <p>Magnetic force How do magnets attract and repel? Which materials are magnetic? Forces and magnetism summary.</p>	<p>consequence contact force attract north south</p>	<p>magnet resistance friction repel pole magnetic field</p>


Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y3 Light </p> 	<p>Physics* The study of energy forces mechanics waves structure of atoms physical universe Earth in Space</p>	<p>Y1 Seasonal changes Y1 Everyday materials Y2 Uses of everyday materials Y3 Forces and magnets</p>	<p>Seeing Do we need light to see things?</p> <p>Shadows How are shadows formed?</p> <p>Changing variables What happens to the size of a shadow when the object moves closer to, or away from, the light source?</p>	<p>absence cast (shadow) impenetrable reflect shadow source (light)</p>	<p>constant dependent independent illuminate translucent variable</p>

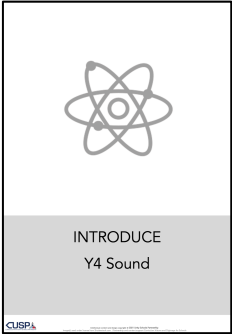
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y3 Plants </p> 	<p>Biology The study of living things, including</p> <p>Structure and function</p> <p>Food and survival</p> <p>Life systems</p> <p>Reproduction</p>	<p>Y1 Plants</p> <p>Y1 Animals, including humans</p> <p>Y2 Living things and their habitats</p> <p>Y2 Plants</p>	<p>Flowering plants What are the parts of a flowering plant? What do they do?</p> <p>Food and survival Do all plants need the same things to thrive and grow?</p> <p>How do leaves make food for the plant?</p> <p>How does water move through a plant?</p> <p>Flower function What do flowers do?</p> <p>What is pollination?</p>	<p>adapt essential glucose transport variety vital</p>	<p>transpiration stoma pollination stamen pistil photosynthesis</p>


Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y4 Living things and their habitats </p> 	<p>Biology The study of living things, including</p> <p>Grouping</p> <p>Classification</p> <p>Environmental change and impact</p>	<p>Y1 Plants</p> <p>Y1 Animals, including humans</p> <p>Y2 Living things and their habitats</p> <p>Y2 Plants</p> <p>Y3 Plants</p>	<p>Living things What are the characteristics of living things?</p> <p>Vertebrates and invertebrates What animals are vertebrates?</p> <p>What animals are invertebrates?</p> <p>Plants What groups are plants classified in?</p> <p>Classification keys What is classification? How do I use a key?</p> <p>Environmental changes What happens if the environment in a habitat changes?</p>	<p>classification environment interdependence interact beneficial hierarchy</p>	<p>vertebrate invertebrate biotic ecosystem species niche</p>

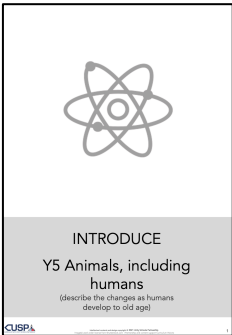
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y4 States of matter I</p> 	<p>Chemistry* the study of the composition, behaviour and properties of matter</p>	<p>Y1 Everyday materials Y2 Use of everyday materials Y3 Forces and magnets</p>	<p>What is matter? What does 'state' mean?</p> <p>What are solids, liquids and gases?</p> <p>Melting: how do materials change state?</p> <p>Evaporating: how do materials change state?</p> <p>Condensing: how do materials change state?</p> <p>Summary: how do materials change their state of matter?</p>	<p>permanent particle solid liquid gas vapour</p>	<p>evaporate condense melt matter state volume</p>

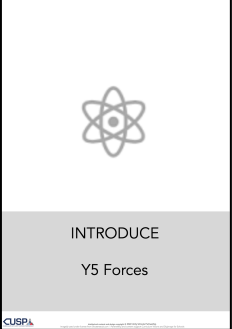
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y4 Animals, including humans </p>  <p>INTRODUCE Y4 Animals, including humans (Teeth, digestion and food chains)</p> <p>CUSPA</p>	<p>Biology The study of living things, including</p> <p>Structure of digestive system</p> <p>Function of digestive system</p> <p>Relationship food chains</p>	<p>Y1 Plants</p> <p>Y1 Animals, including humans</p> <p>Y2 Living things and their habitats</p> <p>Y2 Plants</p> <p>Y3 Plants</p> <p>Y4 Living things and their habitats</p>	<p>Teeth and eating What teeth do humans have? What do they do?</p> <p>How does our mouth and teeth help digestion? What's the process?</p> <p>Can teeth tell us what animals eat?</p> <p>The digestive system What are the parts of the digestive system? What do they do?</p> <p>How does digestion work? What's the process?</p> <p>Food chains What are food chains How do they work?</p> <p>How do I construct and interpret a food chain?</p> <p>SUMMARY How are teeth, digestion and food chains connected?</p>	<p>expel compact digestion acid stomach intestines</p>	<p>incisor canine molar enzyme saliva peristalsis</p>

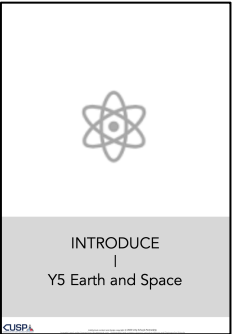
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p style="text-align: center;">Y4 Electricity </p> <div style="border: 1px solid black; padding: 5px; text-align: center;">  <p>INTRODUCE Y4 Electricity</p> <p><small>CUSPA</small></p> </div>	<p style="text-align: center;">Physics* The study of energy forces mechanics waves structure of atoms physical universe Earth in Space</p>	<p>Y1 Seasonal changes</p> <p>Y1 Everyday materials</p> <p>Y2 Uses of everyday materials</p> <p>Y3 Forces and magnets</p>	<p>Sources of electricity What appliances use electricity? What sort of power makes them work?</p> <p>Components Name it - what are the components in a simple series circuit?</p> <p>Apply what you know Diagnose it – what are the effects of changing circuit components and batteries?</p>	<p>associate identify portable effect appliance series</p>	<p>component electrical insulator electrical conductor circuit hypothesis variable</p>

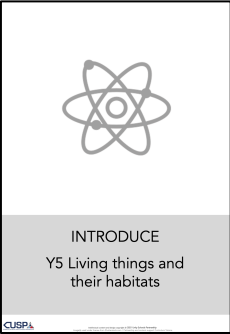
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y4 Sound </p> 	<p>Physics* The study of energy forces mechanics waves structure of atoms physical universe Earth in Space</p>	<p>Y1 Seasonal changes Y1 Everyday materials Y2 Uses of everyday materials Y3 Forces and magnets Y4 Electricity</p>	<p>Properties What is sound?</p> <p>Movement How does sound travel?</p> <p>Pitch and loudness What is the pitch and loudness of sound?</p>	<p>produce property source frequent regular affect</p>	<p>vibrate pitch volume medium vacuum sound wave</p>

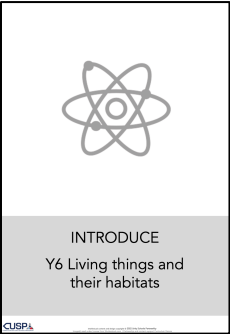
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y5 Properties and changes of materials </p>  <p>INTRODUCE Y5 Properties and changes of materials</p> <p><small>CUSP.L</small></p>	<p>Chemistry* the study of the composition, behaviour properties of matter</p>	<p>Y1 Everyday materials Y2 Uses of everyday materials Y3 Rocks Y3 Light Y4 States of matter</p>	<p>Properties, mixtures and solutions What properties do materials have? How do we use them? What is a mixture? What is a solution? (Solubility) Separation of materials How can we separate materials from a mixture? (Sieving and filtration) How can we separate materials from a solution? (Evaporation) Reversible and irreversible change What changes are reversible? What changes are irreversible?</p>	<p>property particle separate combine recover comparative</p>	<p>atom molecule chemical (changes) physical (changes) reversible reaction</p>

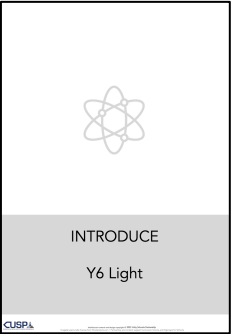
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p style="text-align: center;">Y5 Animals, including humans </p> 	<p style="text-align: center;">Biology The study of living things</p> <p style="text-align: center;">Lifespan and life cycle Change and growth</p>	<p>Y1 Animals, including humans</p> <p>Y2 Animals, including humans</p> <p>Y3 Animals, including humans</p> <p>Y4 Animals, including humans</p>	<p>Life What is the human timeline?</p> <p>Growth How do we change into adults?</p> <p>Compare How do human and animal lifespans compare?</p>	<p>development diverse unique generation mature equipped</p>	<p>adolescence puberty gestation embryo foetus womb</p>

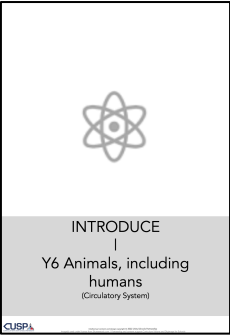
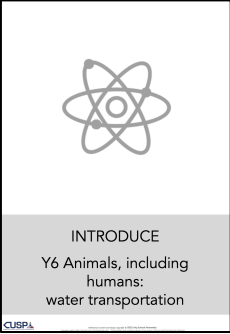
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y5 Forces </p> 	<p>Physics Matter Forces and motion Sound, light and waves Electricity and magnetism Earth in Space</p>	<p>Y3 Forces and magnetism Y3 Light Y4 States of matter Y4 Electricity Y4 Sound</p>	<p>Non-contact and contact forces Remember gravity. When is friction helpful and when is it not?</p> <p>Resistance What is the effect of air resistance? Air resistance investigation</p> <p>Inspirational scientist Who was Galileo Galilei?</p> <p>Resistance What's the effect of water resistance?</p> <p>Levers, pulleys and gears How do levers help us? How do pulleys and gears help us?</p>	<p>opposite reaction advantage displace weight mass</p>	<p>pulley gear pivot fulcrum lever upthrust</p>

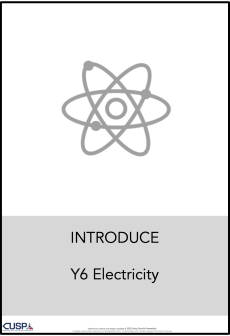
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y5 Earth and Space </p> 	<p>Physics Matter Forces and motion Sound, light and waves Electricity and magnetism Earth in Space</p>	<p>Y3 Forces and magnetism Y3 Light Y4 States of matter Y4 Electricity Y4 Sound Y5 Forces</p>	<p>Position, relationship / movement of planets / spherical bodies. What are the planets in our solar system? (Planet comparison)</p> <p>How does the view of the Moon change in a solar month? (Moon phases, moon diaries)</p> <p>The effect of the Earth's rotation, tilt and orbit has on day, night and seasons. Why does the rotation of the Earth result in day and night?</p> <p>Why is the Earth's tilt (axis) responsible for the seasons?</p>	<p>luminous phenomenon attraction approximately relative apparent</p>	<p>orbit axis crescent gravitational waxing waning</p>

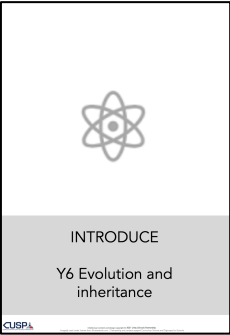
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
<p>Y5 Living things and their habitats I</p> 	<p>Biology I The study of living things, including</p> <p>Structure Order Life cycles Reproduction</p>	<p>Y1 Plants</p> <p>Y2 Plants</p> <p>Y3 Plants</p> <p>Y3 Living things and their habitats</p> <p>Year 4 Living things and their habitats</p>	<p>Mrs GREN – Recap of life processes</p> <p>Life Cycles What’s the difference between a mammal and amphibian?</p> <p>What’s the difference between an insect and a bird?</p> <p>What is similar and what is different between the life cycle of a mammal, amphibian, insect and bird?</p> <p>Inspirational scientists Who was Maria Merion and what did she do?</p> <p>Reproduction How do living things reproduce?</p> <p>Plants and animals – what’s the life process of reproduction.</p>	<p>deduce process re-form transform adolescence contrast</p>	<p>embryo sexual metamorphosis incubate biochemical fertilisation</p>

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<p>Y6 Living things and their habitats I</p> 	<p>Biology I The study of living things, including</p> <p>Pioneering scientists Classification</p>	<p>Y1 Plants</p> <p>Y2 Plants</p> <p>Y3 Plants</p> <p>Y3 Living things and their habitats</p> <p>Year 4 Living things and their habitats</p> <p>Y5 Living thing and their habitats</p>	<p><u>Pioneering scientists</u> Who was the scientist Carl Linnaeus and what did he do?</p> <p><u>Classification</u> How do we classify vertebrates? How do we classify invertebrates we know? How do we classify invertebrates we don't know? How do we classify invertebrates we don't know?</p> <p><u>Apply</u> What animals can I classify? What animals and plants exist in my local environment?</p>	<p>Characteristic Interdependence Specific Categorise Primitive Hierarchy</p>	<p>Fungus Arthropod Taxonomy Kingdom Phylum Genus</p>

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<p>Y6 Light </p> 	<p>Physics Matter Forces and motion Sound, light and waves Electricity and magnetism Earth in Space</p>	<p>Y1 Everyday materials Y2 Uses of everyday materials Y3 Light Y4 States of matter Y4 Sound Y4 Electricity Y5 Forces Y5 Earth in Space</p>	<p><u>Properties of light</u> How does light travel? What colour is light made of?</p> <p><u>Reflection</u> Reflection - how does light help us to see objects? Which surfaces make the best reflectors?</p> <p><u>Colour</u> Why do we see objects as a particular colour?</p> <p><u>Refraction</u> What happens to the appearance of objects when placed in water?</p>	<p>Impurity Emit Absorb Constituent Filter Artificial</p>	<p>Refraction Incidence Spectrum Prism Lux Piment</p>

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<p>Y6 Introduce animals, including humans </p>  	<p>Biology The study of living things</p> <p>Structure and function of the circulatory system Health and exercise</p>	<p>Y1 Animals, including humans identify animals – mammal, reptile, bird, amphibian, fish</p> <p>Y2 Animals, including humans Reproduction and basic needs</p> <p>Y3 Animals, including humans Nutrition Structure of humans and animals</p> <p>Y4 Animals, including humans Human digestion</p> <p>Y5 Animals, including humans Lifespans and life cycles, growth and change</p>	<p>Blood and blood vessels What is blood made of and why do we need it? Why do our bodies need nutrients and how are they transported? What is our circulatory system?</p> <p>The functions of the heart What is our heart like inside? How does it work? Who influenced what we know about our circulatory system?</p> <p>The effect of exercise, drugs and lifestyle What can we do to keep healthy? Present and explain what we know about the circulatory system, nutrients and keeping healthy.</p> <p>Digestion and circulation Remember circulation and digestion: how are these two systems connected?</p> <p>Removal of waste Where are the kidneys and what do they do?</p> <p>Keeping healthy How do kidneys keep us healthy?</p>	<p>Cell Chamber System Circulation Vessel Clot Filter Expel Substance Function Regulate Transform</p>	<p>Plasma Platelet Artery Capillary Vein Ventricle Kidney Bladder Urine Excretion Toxin Nutrient</p>

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<p>Y6 Electricity I</p> 	<p>Physics Matter Forces and motion Sound, light and waves Electricity and magnetism</p>	<p>Y1 Everyday materials (chem) Y2 Uses of everyday materials (chem) Y3 Light Y4 States of matter Y4 Sound Y4 Electricity Y5 Forces Y5 Earth in Space</p>	<p><u>Do-it</u> What is electricity? How does it work? How do we build and represent a series circuit? What are the components in a series circuit?</p> <p><u>Test-it</u> How does the number of cells and voltage affect components in a circuit?</p> <p><u>Diagnose-it</u> What are the effects and consequences of changing circuit components and batteries?</p>	<p>Component Consequence Systematic Represent Source Generate</p>	<p>Proton Neutron Electron Terminal Series Voltage</p>

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<p>Y6 Evolution and Inheritance </p> 	<p>Biology The study of living things</p> <p>Change Evolution Adaption Environment</p>	<p>Y3 Plants</p> <p>Y4 Living things and their habitats</p> <p>Y5 Living things and their habitats</p> <p>Y6 Living things and their habitats</p>	<p><u>Change over time</u> How have living things changed over time? How do we know? How has life evolved over time?</p> <p><u>Biological change</u> What is DNA and what does it do? Are all offspring identical to their parents?</p> <p><u>Theories of evolution</u> Darwin and Wallace – what evidence did they share to argue the case for evolution? Survival of the fittest - how have animals adapted and evolved to suit their environment?</p>	<p>Characteristic Adaptation Acquire Theory Modify Generation</p>	<p>Evolve Survival Species Clone Inherit Fossil</p>