Wave Trust
Science Curriculum

Our Trust curriculum, used in the Regional APAs by our solo Subject Leads, is underpinned by our WAVE values, which also serve as powerful and unique drivers for our curriculum:

Be positive: We have the highest expectations of what our pupils are capable of, no matter what their starting points, and no matter how many fresh starts. Through our Curriculum offer, we will strive to develop unique talents; build confidence; character, aspiration; attainment and at KS4, also qualifications. We aim to prepare pupils for their next steps, and life in modern Britain. We believe every child can learn to read.

Have empathy: We seek first to understand, then to be understood. Through our curriculum, we will develop empathetic learners who have an awareness, understanding and are considerate of themselves; their peers; our communities; as well as of the world around us all.

Show respect: Our curriculum will support of students to respect themselves, each other and teach an understanding and awareness of diversity.

Work as one team: Our curriculum gives our students opportunities to work collectively together, through opportunities to talk, listen, and create. We will draw on every opportunity for learning, both planned and unplanned, to develop pupils' ability to reflect, engage and relate positively to one another.

Be inclusive: We will strive to ensure our curriculum is accessible and meets the needs of all our learners. Not one size fits all, but skilfully adapted to meet individual need and SEND/SEMH need.

Science Intent

Our Science curriculum from Key Stage 1 to 4 is premised on the National Curriculum.
Science will deepen specific scientific skills and knowledge to ensure that pupils develop the scientific, environmental and social awareness to become informed members of the local and global community. We want our students to be equipped with the scientific skills required to understand the uses and implications of science, today and for the future.
Our curriculum will enable children to become enquiry based learners collaborating through researching, investigating and evaluating experiences. It will encourage respect for living organisms and for the physical environment.

Teachers will ensure that all pupils are exposed to high quality teaching and learning experiences. These will hook the pupils' interest, enabling them to develop a sense of excitement and curiosity about natural phenomena. They will be encouraged to ask questions about the world around them and work scientifically to further their conceptual understanding and scientific knowledge.

Pupils will be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes. It will provide opportunities for the critical evaluation of evidence and rational explanation of scientific phenomena as well as opportunity to apply their mathematical knowledge to their understanding of science, including collecting, presenting and analysing data. Pupils will be immersed in key scientific vocabulary, which supports in the acquisition of scientific knowledge and understanding.

In our Wave AP Academies, we want to reengage pupils in science and be able to return to mainstream, or their next school, with sufficient component knowledge to keep up with their peers.

We are not WHOLE THROUGH provision, and it is exceedingly rare that pupils with us in Primary AP transfer to Secondary AP. However, the Primary and Secondary phases prepare pupils mindful of prior experiences and future learning, in whatever setting they come from or return to, so that no pupil is disadvantaged.

Our curriculum is thus designed very much with the journey and destination in mind, enabling teachers to take account of prior learning, and support progress and engagement.

Primary Science Curriculum

Pupils in our Wave Regional Academies are taught in mixed year classes. We therefore have a rolling Year A and Year B curriculum map, that staff can draw from to support their planning.

Our Trust and Academy intent with our Science curriculum is to encourage **love** of learning about Science by stimulating the children's interest and enthusiasm for the subject. We aim to ensure that children **learn** to expand their knowledge of the world around them and practice key scientific skills such as researching, working methodically, recording, categorising and considering the implications of their scientific knowledge. Children will work individually and as part of a team to carry out investigations. The aim being that the children's **lives** are enriched with increasing confidence in their own learning, the embedding of meta-cognitive techniques for deeper consideration of the topic, and an understanding of the importance of working together independently and collaboratively.

At or Wave Primary Academies, we use the Kapow Primary Science Curriculum, which aims to develop a sense of excitement and curiosity about natural phenomena and an understanding of how the scientific community contributes to our past, present and future. We believe this gives pupils the grounding they need to be able to successfully reintegrate, and provides the ground work for Key Stage 3. Whilst in our Regional AP provision, pupils do not transition into our Secondary provision except in very rare circumstances, we know that we need to prepare them for the Key Stage 3 in mainstream, or their permanent placement.
This curriculum is designed to develop a complex knowledge of Biology, Chemistry and Physics, but also adopt a broad range of skills in working scientifically and beyond.
The scheme of work is inclusive and meaningful, so all pupils may experience the joy of science and make associations between their science learning and their lives outside the classroom.
We adapt learning for pupils with SEND, but maintain a belief that Science is for all and a sequenced, resourced curriculum laid out clearly enables teachers to support our pupils effectively. There may be times in AP, linked to our core overarching intent, where we may need to focus on phase one outcomes, but we ensure the curriculum pupils return to is not disjointed.

Studying science allows children to appreciate how new knowledge and skills can be fundamental to solving arising global challenges. The curriculum aims to encourage critical thinking and empower pupils to question the how's and whys of the world around them.

The Kapow Scheme encourages:
● A strong focus on developing knowledge alongside scientific skills across Biology, Chemistry and Physics.
● Curiosity and excitement about familiar and unknown observations.
● Challenging misconceptions and demystifying truths.
● Continuous progression by building on practical and investigative skills across all units.
● Critical thinking, with the ability to ask perceptive questions and explain and analyse evidence.
● Development of scientific literacy using wide-ranging, specialist vocabulary.

Implementation

Our Kapow Curriculum identifies the following strands:
● Scientific knowledge and understanding of:
○ Biology - living organisms and vital processes.
○ Chemistry - matter and its properties.
○ Physics - how the world we live in 'works'.
● Working scientifically - processes and methods of science to answer questions about the world around us.
● Science in action - uses and implications of science in the past, present and for the future.

We build on these strands through our Lily Pad Key Stage 3 Science curriculum.

Kapow Primary's Science Scheme is a spiral curriculum, with essential knowledge and skills revisited with increasing complexity, allowing pupils to revise and build on their previous learning. A range of engaging recall activities promote frequent pupil reflection on prior learning, ensuring new learning is approached with confidence. The Science in Action strand is interwoven throughout the scheme to make the concepts and skills relevant to pupils and inspiring for future application. Cross-curricular links are included throughout each unit, allowing children to make connections and apply their science skills to other areas of learning.

Each unit is based upon one of the key science disciplines; Biology, Chemistry and Physics and, to show progression throughout the school, Kapow has grouped the National curriculum content into six key areas of science:

- Plants
- Animals, including humans
- Living things and habitats
- Materials
- Energy

- Forces, Earth and space.

Pupils explore knowledge and conceptual understanding through engaging activities and an introduction to relevant specialist vocabulary. As suggested in Ofsted's Science research review (April 2021), the 'working scientifically' skills are integrated with conceptual understanding rather than taught discretely. This provides frequent, but relevant, opportunities for developing scientific enquiry skills. The scheme utilises practical activities that aid in the progression of individual skills and also provides opportunities for full investigations.
Each year group has a 'Making Connections' unit that delves beyond the essential curriculum, assimilating prior knowledge and skills to evoke excitement and to provide an additional method of assessing scientific attainment.

Impact

The approach to the teaching of science at our Wave Trust Academies School results in a fun, engaging, high quality science education, that provides children with the foundations for understanding the world that they can take with them once they complete their primary education. It gives them an introduction to the possibilities ahead of them in the fields of science.
Assessment
The impact of using the Kapow Primary's Science Scheme can be constantly monitored through both formative and summative assessment opportunities.

Each unit has a unit quiz and a knowledge and skills catcher, which can be used to provide a summative assessment. Opportunities for children to communicate using scientific vocabulary also forms part of the assessment process in each unit. In Secondary, this approach is followed within the Key Stage 3 Lily Pad curriculum, with pupils taught in mixed age small Ket Stage 3 classes. Assessment at the start of topics is therefore critical to support planning, as pupils are referred into AP with different amounts of prior learning.

By using the Kapow Primary Science Scheme, pupils should leave school equipped with the requisite skills and knowledge to succeed in key stage 3 Science. They will have the necessary tools to confidently and meaningfully question and explore the world around them, as well as critically and analytically experiencing and observing phenomena. Pupils will understand the significance and impact of Science on society.

As we use the Kapow Primary Science Scheme, children have the opportunity to:
● Develop a body of foundational knowledge for the Biology topics in the National curriculum: Plants; Animals, Including Humans; Living Things and Their Habitats; Evolution and Inheritance.
● Develop a body of foundational knowledge for the Chemistry topics in the National curriculum: Everyday Materials; Uses of Everyday Materials; Properties and Changes of Materials; States of Matter; Rocks.
● Develop a body of foundational knowledge for the Physics topics in the National curriculum: Seasonal Changes; Forces and Magnets; Sound; Light; Electricity; Earth and Space.
● Be able to evaluate and identify the methods that 'real world' scientists use to develop and answer scientific questions.
● Identify and use equipment effectively to accurately gather, measure and record data.
● Be able to display and convey data in a variety of ways, including graphs.
● Analyse data in order to identify, classify, group, and find patterns.
● Use evidence to formulate explanations and conclusions.
● Demonstrate scientific literacy through presenting concepts and communicating ideas using scientific vocabulary.
● Understand the importance of resilience and a growth mindset, particularly in reference to scientific enquiry.
● Meet the end of key stage expectations outlined in the National curriculum for Science.

Primary Science

KS1	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year A	Living things and their habitats: Habitats	Animals including humans: Sensitive Bodies	Forces, Earth and Space: Seasonal Change	Materials: Use of Everyday Materials	Plants: Introduction to Plants	Making Connections: TBC
Year B	Animals including Humans:	Materials: Use of Everyday Materials	Plants: Plant Growth	Animals including Humans: Life	Living things and their Habitats: Microhabitats	Making Connections: TBC

	Comparing Animals			Cycles and Health		
LKS2	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Year A	Materials: Rocks and Soils	Energy: Sound and Vibration	Living things and their Habitats: Classification and Changing Habitats	Energy: Electricity and Circuits	Animals including Humans: Digestion and Food	Making Connections: TBC
Year B	Plants: Plant Reproduction	Animals including Humans: Movement and Nutrition	Energy: Light and Shadows	Forces, Earth and Space: Forces and Magnets	Materials: States of Matter	Making Connections: TBC
UKS2	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Year A	Energy: Light and Reflection	Energy: Circuits, Batteries and Switches	Living things and their Habitats: Classifying Big and Small	Living things and their Habitats: Life Cycles and Reproduction	Forces, Earth and Space: Earth and Space	Making Connections: TBC
Year B	Living things and their Habitats: Evaluation and Inheritance	Materials: Properties and Change	Materials: Mixtures and Separation	Forces, Earth and Science: Imbalanced Forces	Animals including Humans: Circulation and Exercise	Making Connections: TBC

Secondary Science
Key Stage 3

At Secondary, we build on the Primary Curriculum. It is important to state that pupils do not stay with us from Primary to Secondary except in very rare circumstances.
Assessment at the start of each topic plays a key role, where pupils join us in the Regional Academies with different levels of prior learning. At the Trust, we have developed a central Science Curriculum in order to support teachers' planning. This is called 'Lilypads'.
Wave students in the Regional Academies are taught in mixed ability/age KS3 classes due to our small numbers, and may have Science lessons up to 3 lessons a week where accessing the core timetable, though Principals determine this. This presents a challenge and opportunity to curriculum design. Pupils arrive with very different experiences and prior learning. 'Sufficient cumulative component knowledge' underpins our Science Trust Curriculum intent in supporting pupils move forwards from their unique starting points.
Students at the APs are not usually in the same setting for their entire 3 years of KS3. Students commonly enter and leave at any time throughout the Key Stages.

Audit, both internal and external through the Cornwall and Devon Science Learning Partnership in 2021 reflected that KS3 schemes were too large and students had gaps in their knowledge, so it was difficult to teach the schemes. We therefore worked with Ed Walsh, External Science Consultant and author of Collins Ket Stage 3 Science schemes, to create the Lily Pad scheme. LilyPads was developed to be the Wave KS3 Science Curriculum, with the support of an External Science Consultant. There are different pathways through the scheme depending on the student's knowledge however there is a core of non-negotiable objectives in each LilyPad

It is important though that students have access to all of the KS3 PoS, as they will otherwise be at a disadvantage when they go back to mainstream. Therefore, the LilyPads Benchmark Curriculum covers the vast majority of the KS3 Programme of Study (Subject Content and Working Scientifically) through the three pathways, this is shown in the mapping document. Staff create their own planning through this long-term overview set out here, around the needs of their classes.

Assessment in Science

Pupils are assessed on entry and at the start of each Unit below and teachers use this data to inform their teaching and planning. Pupils attainment is tracked formatively throughout the unit using a Formative Tracking tool which enables teachers to keep a granular track of how well pupils are learning the curriculum, and can inform transitions.

LilyPad KS3 Long Term Plan

LilyPad	Date	Subject Content (LilyPad A, B or C) and Big Ideas
P1 (Energy)	**Autumn 1**	Energy costs, Energy transfers, Waves, Electricity & Magnetism **Big Idea: Energy is conserved, Electricity transfers energy, Radiation transfers energy, Fields produce forces**
C1 (Particles)	**Autumn 2**	Particle model, ECM, pure & impure substances (separation techniques), Periodic Table ***Big Ideas: Structure determines Properties, Reactions rearrange matter***
B1 (Cells & Systems)	**Spring 1**	Cells, Skeleton & muscles, Nutrition & Digestion, Gas Exchange, Reproduction & Health ***Big Ideas: Cells are alive, Bodies are systems***
C2 (Earth)	**Spring 2**	Materials (metals & non-metals), Chemical Reactions, Energetics, Earth & Atmosphere **Big Ideas: *Reactions rearrange matter, Earth systems interact***
B2 (Ecosystems & Genetics)	**Summer 1**	Photosynthesis, Respiration, Ecosystems, DNA & Inheritance, Variation **Big Ideas: Species show variation, Characteristics are inherited, Cells are alive**
P2 (Forces)	**Summer 2**	Forces (friction, balanced forces, motion), Pressure, Density, Space Physics **Big Ideas: Forces predict motion, Fields produce forces, Energy is conserved**

LilyPad Journey

1. Students take baseline test (either written or teacher led) to decide which LilyPad they will follow (A, B or C). The LilyPad journey is not fixed so students can jump between LilyPads during the half term depending on their knowledge.

2. Each lesson is based around an objective – with the non-negotiable objectives taking priority. Formative assessment of those objectives throughout the module through low stakes testing (Quizizz, Seneca, footprints) is carried out. Working Scientifically is embedded into each module and the progression can be seen using the mapping page.

3. Student progress is recorded as the module is taught on LilyPad progress grid. This formative assessment is used to inform teaching and is not meant to be summative. The progress grid can be passed to the new school when the student leaves the centre.

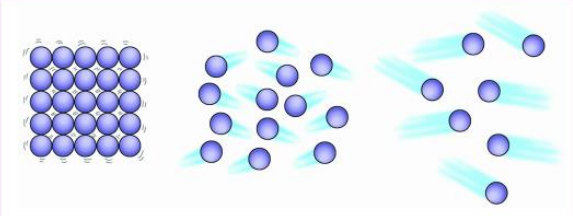
4. Students given an end of module assessment (LilyPad A, B and C tests available) as a summative assessment. This is available as a written and Quizizz version.

Teachers will find the long-term plan in more detail on the Science SharePoint.

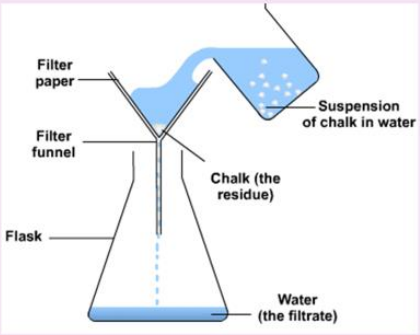
Pupils having opportunities in terms of Working Scientifically is mapped out here, and teachers will plan to support learning of these strands so that pupils know and understand what it means to think and work as a Scientist.

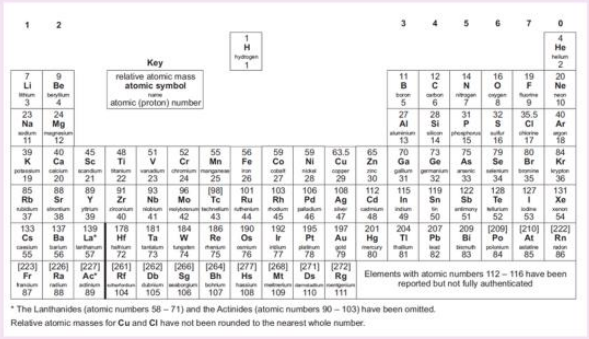
LilyPads Working Scientifically Mapping		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Code	N.C Subject Content	P1 Energy	C1 Particles	B1 Cells & Systems	C2 Earth	B2 Ecosystems & Genes	P2 Forces
WS1.1	pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility	A, B & C	A, B & C	B & C	A, B & C	B & C	A, B & C
WS1.2	understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review	C	B	A & C	A, B & C	C	A, B & C
WS1.3	evaluate risks.	A, B & C	A, B & C	A, B & C	A, B & C	A, B & C	A, B & C
WS2.1	ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience	B & C	B	A, B & C	B & C	B & C	A, B & C
WS2.2	make predictions using scientific knowledge and understanding	B & C	B & C	B & C	C	B & C	A, B & C
WS2.3	select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate	B & C	B	B & C	B	B & C	A, B & C
WS2.4	use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety	A, B & C	A, B & C	A, B & C	A, B & C	A, B & C	A, B & C
WS2.5	make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements	A, B & C	B	B & C	B	A, B & C	A, B & C
WS2.6	apply sampling techniques.			A & B		C	
WS3.1	apply mathematical concepts and calculate results	A, B & C	A, B & C	A, B & C	A, B & C	B & C	A, B & C
WS3.2	present observations and data using appropriate methods, including tables and graphs	A, B & C	A, B & C	A, B & C	A, B & C	A, B & C	A, B & C
WS3.3	interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions	A, B & C	A, B & C	A, B & C	A, B & C	A, B & C	A, B & C
WS3.4	present reasoned explanations, including explaining data in relation to predictions and hypotheses	B & C	B & C	B & C	B & C	B & C	A, B & C
WS3.5	evaluate data, showing awareness of potential sources of random and systematic error	B & C		C	C	B & C	B & C
WS3.6	identify further questions arising from their results.	B & C	B	B & C	B & C	B & C	B & C
WS4.1	understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature	A, B & C	A, B & C	A, B & C	A, B & C	A, B & C	A, B & C
WS4.2	use and derive simple equations and carry out appropriate calculations	A, B & C		B		C	A, B & C

Examples of Autumn term's Particles Curriculum Overview is set out here. All 6 Units follow a similar format. Teachers take account of prior learning, and plan around needs of individuals, creating meaningful sequences and outcomes. The 3 lily pads enable a Year A and Year B, to increase depth, breadth and stretch when revisiting 'Particles' for example, so that pupils who remain in an AP KS3 class for longer than a Year do not repeat content:



Autumn 2
C1 Particles





Big Ideas

Structure determines properties

Reactions rearrange matter

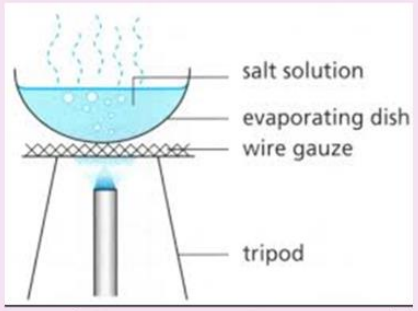
Topics

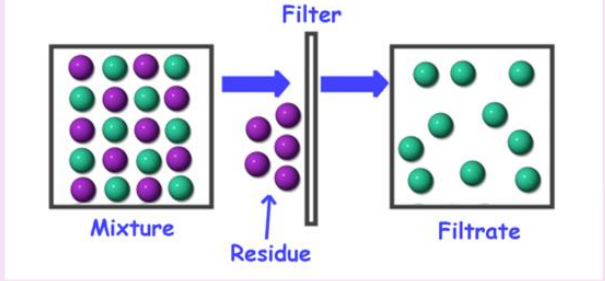
Particle model

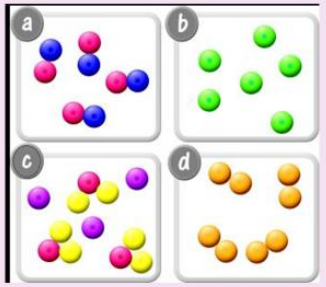
Elements, Compounds & Mixtures

Pure & impure substances (separation techniques)

Periodic Table







Particle Model – LilyPad A (Non-negotiables in bold) Students can…

2A – Particle Model A Objectives	Suggested Activities & WS
2.A1 Describe the properties of solid, liquid and gas in terms of particles	Draw and identify diagrams of S,L,G
2.A2 Describe the changes of state in terms of particle movement	Worksheet
2.A3 Prepare a table to record results, use the measuring equipment correctly and represent results on a suitable graph	Use a Bunsen to heat substance, take temperature, record results in table, calculate an average and draw a graph.
2.A4 Identify and describe the properties of Elements, Compounds & Mixtures	Use particle diagram to classify ECM Iron and sulphur practical
2.A5 Identify the symbols for common elements	H, O, N, C, Zn, Fe, Cu, S, I, Al, Br, Cl, Mg, Na, K, Ag, Au
2.A6 Describe the Structure of periodic table, identifying metals, non-metals and the names of the main groups	Worksheet
2.A7 Name compounds using chemical formula showing number of atoms and elements in a chemical substance	Worksheet – Numbers of atoms and elements in a compound
2.A8 Explain how solutions are made	Recap Diffusion. Jolly Jelly activity
2.A9 Describe and carry out method to separate an insoluble solid from a soluble solid	Practical - Separating sand and salt (filtration and evaporation)
2.A10 Describe and carry out method of how to separate different coloured substances using Chromatography	Practical - Pens and ink, skittles and water,
2.A11 Describe and carry out method of how to separate two soluble substances using Simple distillation	Practical - how you can get pure water from ink solution

Particle Model – LilyPad B (Non-negotiables in bold) Students can…

2B – Particle Model B Objectives	Suggested Activities & WS
2B.1 Explain gas pressure in terms of particles	Worksheet. Blowing up balloons demo
2B.2/3 Explain the changes in state in terms of changes to the energy of the particles.	Find the melting point of salol by collecting data and plotting a graph. Graph Worksheet
2B.4 Represent atoms, molecules and elements, mixtures and compounds using particle diagrams.	Worksheet, coloured circles to make compounds
2B.5 Use observations of a pattern in chemical reactions to predict the behaviour of an element in a group	
2B.7 Given chemical formulae, name the elements present and their relative proportions.	
2B.8 Use the solubility curve of a solute to explain observations about solutions.	Dissolving / saturation investigation
2B.9 Choose the most suitable technique to separate out a mixture of substances	How much salt can you get out of rock salt? Investigation / competition
2B.10 Use evidence from chromatography to identify unknown substances in mixtures	
2B.11 Explain how two soluble substances with different boiling points can be separated using Simple distillation	Practical - how you can get pure water from ink solution

Particle Model – LilyPad C (Non-negotiables in bold) Students can…

2C – Particle Model C Objectives	Suggested Activities & WS
2C.1 Predict whether a compound or element is S, L or G at different temperatures using boiling and melting point data.	**Worksheet**
2C.2 Describe and explain the changes that occur in the particle arrangement as shown in heating and cooling curves	**Worksheet Practical for heating or cooling curve**
2C.3 Describe the structure of an atom including the sub-atomic particles	Worksheet
2C.4 Compare and contrast the properties of elements and compounds and justify a reason for these differences.	Worksheets
2C.5 Predict the position of an element in the Periodic table based on information about its physical and chemical properties.	Worksheet and Test base questions
2C.8 Analyse and interpret solubility curves	Worksheet and Test base questions
2C.9 Suggest a combination of methods to separate a complex mixture and justify the choices.	**Practical: Separating Iron and pure salt from shipwreck (iron and rock salt)**
2C.10 Use evidence from chromatography to calculate Rf values.	**Chromatography - calculate Rf values.**
2C.11 Explain how two soluble substances with similar boiling points can be separated using Fractional Distillation	Practical – how many of the fractions can you get out of cherry coke?

Particles- Working Scientifically Autumn 2

2A – Particles A	2B - Particles B	2C – Particles C
2A3 – Practical – Bunsen Skills ***WS 1.1, 1.3, 2.4, 3.1, 3.2, 4.1, 4.3***	**2B1/2 – Practical – Melting Point of a Solid** ***WS 1.1, 1.3, 2.2, 2.4, 3.1, 3.2, 3.3, 4.1, 4.3***	**2C2 – Practical – Describe and Explain what happens when a solid melts and boils** ***WS 1.1, 1.3, 2.2, 2.4, 3.1, 3.2, 3.3, 4.1, 4.3***
2A4 – Practical – Mixing Iron and Sulphur *WS 1.3, 2.2, 2.4, 3.3*	**2B8 – Investigation – Factors affecting solubility** ***WS 1.1, 1.3, 2.1, 2.2, 2.3, 2.4, 2.5, 3.2, 3.4, 3.5, 3.6, 4.1, 4.3***	**2C9 – Investigation - Separating Iron and pure salt from shipwreck (iron and rock salt)** ***WS 1.1, 1.3, 2.1, 2.2, 2.3, 2.4, 2.5, 3.2, 3.4, 3.5, 3.6, 4.1, 4.3***
2A8 – Practical – Dissolving Jelly ***WS 1.3, 2.2, 2.4, 3.3***	**2B9 – Investigation – How much salt can you get our of rock salt** ***WS 1.1, 1.3, 2.1, 2.2, 2.3, 2.4, 2.5, 3.2, 3.4, 3.5, 3.6, 4.1, 4.3***	**2C10 - Practical – Chromatography calculating Rf values** ***WS 1.1, 1.3, 2.4, 3.2, 3.3, 4.3***
2A9 - Practical – Separate insoluble from soluble solid ***WS 1.1, 1.3, 2.4, 3.2***	**2B10 - Practical – Chromatography** ***WS 1.1, 1.3, 2.4, 3.2***	**2C11 - Practical – Fractional Distillation of Cherry Coke** ***WS 1.1, 1.3, 2.2, 2.4, 3.2***
2A10 - Practical – Chromatography ***WS 1.1, 1.3, 2.4, 3.2***	**2B11 - Practical – Simple Distillation** ***WS 1.1, 1.3, 2.4, 3.2***	
2A11 - Practical – Simple Distillation *WS 1.1, 1.3, 2.4, 3.2*		

Each Science Lead will draw from the above overviews to plan their sequences of learning using the Trust proforma and based on accurate assessment of pupil's starting points in terms of prior learning. These schemes of learning show how the above knowledge is broken down into smaller sequenced steps and a secondary equivalent of 'I can' statements broken down. For example:

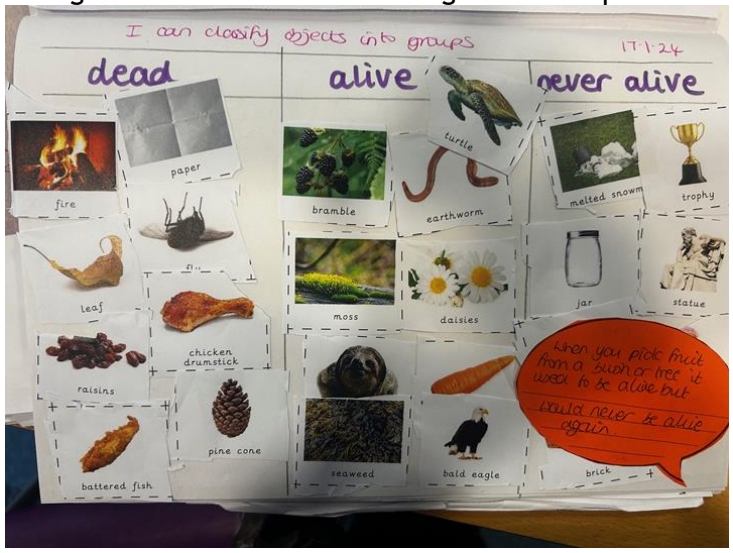
Granular Component Knowledge to support development of own schemes of learning

Week	Objectives	Outcomes	Resources /Activities	Key Vocabulary
1	**L1 - Describe the properties of solid, liquid and gas in terms of particles**	Draw diagrams to show arrangement of particles in solids, liquids and gases – Starter Explain how solids, liquids and gases behave differently because of how their particles are arranged. – Task 1 & 2 Explain how the behaviour of water particles are different in the three states – Task 3	Particles Student Booklet L1 Teachers Powerpoint Slides L1 Video - ScienceMonkey	Particles Solid Liquid Gas Vibration
	L2 - Describe the changes of state in terms of particle movement	Name the changes of state (Task 1) Describe evaporation and melting, linking to particle model (Task 2) Explain changes of state in terms of changes to the energy of the particles. (Task 3)	Particles Student Booklet L2 Teachers Powerpoint Slides L2 Video – Fuse School Animations Boiling and Melting (pbslearningmedia.org) Focus Education – Changes of state Essential Chemistry - Focus eLearning by Focus Educational Software ltd.	Melting Freezing Condensation Evaporation Sublimation

Key Stage 4
At Key Stage 4, our Regional APAs offer AQA GCSE Biology, and AQA GCSE Trilogy where pupils are with us for long enough and practical Lab facilities allow within the constraints of AP where facilities and technician support cannot operate in the same way as it would in a larger secondary school. In the context of other AP providers nationally, our GCSE aspiration and offer is notable. BTEC Science is also offered in some of our APAs where appropriate.

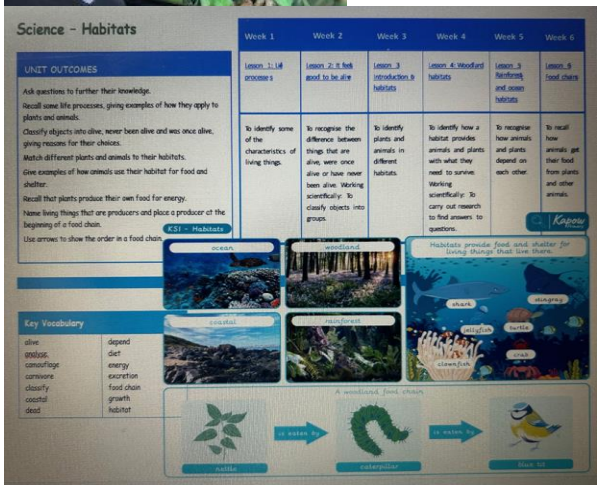
Science at Shoreline Academy

In Primary, we aspire to develop an interest in the world through exploration and the study of living and non-living things. We aim to develop knowledge and understanding of scientific ideas through the study of living things, the environments in which they live, energy and forces, materials and processes of change It is our intention to recognise the importance of science in every aspect of daily life.

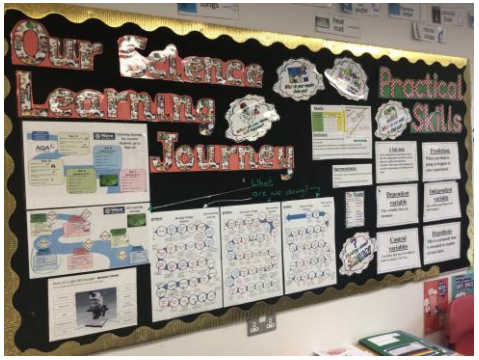


We develop a scientific approach to problem-solving by observing, asking questions, discerning patterns, hypothesising, planning, experimenting, designing, making, measuring, discussing, analysing and evaluating results. This will develop the natural curiosity of the pupils, encourage respect for living organisms and the physical environment and provide opportunities for critical evaluation of evidence. Our science curriculum enables children to become enquiry-based learners with an awareness of how science will affect their lives as they grow up.

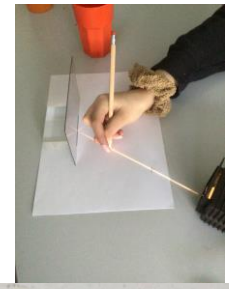
Kapow Primary's Science scheme is a spiral curriculum, with essential knowledge and skills revisited with increasing complexity, allowing pupils to revise and build on their previous learning. A range of engaging recall activities promote frequent pupil reflection on prior learning, ensuring new learning is approached with confidence. The Science in action strand is interwoven throughout the scheme to make the concepts and skills relevant to pupils and inspiring for future application. Cross-curricular links are included throughout each unit, allowing children to make connections and apply their Science skills to other areas of learning. Following this scheme enables us to ensure we have full coverage of the National Curriculum learning objectives.

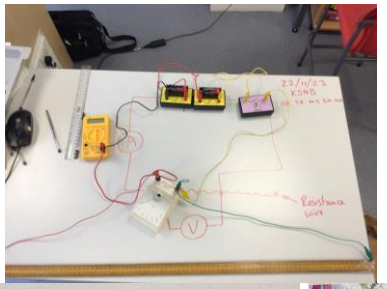


Students are grouped according to ability, broadly in Key Stages and lessons are conducted in small groups. We use mixed-age planning to ensure we can scaffold for our lower ability and challenge our higher ability. Running a two-year rolling programme with one unit taught each half term enables us to cover the curriculum and we have a variety of practical resources to support science lessons to ensure teaching is fun, engaging and meaningful. We also draw on experts in science on our secondary site and share resources where appropriate. Knowledge organisers allow students to reflect and build on learning, and staff use a RAG rating system to continually assess against objectives as well as quizzes to show knowledge before and after the units are taught. Capturing knowledge is done in a variety of ways – student voice bubbles, photographs, class discussions and evidence in workbooks. We also utilise the outdoor environment wherever possible, bringing scientific ideas to life and we access local areas such as beaches, forests, parks and animal centres. Displays are used to celebrate learning and to ensure knowledge gained is transferred into the long-term memory.



In Secondary, LilyPads has been developed to be the Wave KS3 Science Benchmark Curriculum. There are different pathways through the scheme depending on the students' knowledge; however, there is a core of non-negotiable objectives in each LilyPad It is important though that students have access to all the KS3 Program of Study, as they will otherwise be at a disadvantage when they go back to mainstream. Therefore, the LilyPads Benchmark Curriculum covers the vast majority of the KS3 Programme of Study through the other pathways.





In KS4, the appropriate course is chosen for the individual student. For some this is AQA Biology and for other students it is Combined Science (Trilogy), which is the course covered by the majority of local secondary schools, so allows for students transitioning to and from Shoreline to have the best chance of success with their GCSE exams. Biology is chosen as the single science as the topics such as diet and exercise, immunity and response and Homeostasis (to name a few) will help students to make informed life decisions. Students who have been with Shoreline in the long term have the opportunity to work towards the combined science double GCSE. Giving students the ability to conduct practicals and work Scientifically supports learning at both Key Stage 3 and 4. "I like the fact that you get a choice in what to learn next, there are so many different options" – Year 10 student.