



Big Question: What is the role of water in the geography of Wales?

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| AoLE: Science and Technology | Subject: Science - | Year: 8 |
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| Big Question / Aim / Objective / Concept | Vision (Proposed outcome) / Purpose of curriculum | Prior knowledge / Learners previous knowledge |
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| <p>What is the role of water in the geography of Wales?</p> | <p>This unit considers the role of water in the geographical changes of the Earth. This unit uses the context of safe water supplies to introduce and develop the idea that many everyday substances are actually mixtures and that these mixtures can be separated, using a variety of techniques, to produce useful materials. This unit examines the different types of rock and the processes which bring about their formation, leading to the idea of a rock cycle which operates within a huge geological time scale. It also looks at ways in which the formation of rocks has been explained in the past with specific focus on the role of water within the rock cycle. The unit will consider local, national and international issues relating to water and introduce these concepts so students can relate the big picture concepts to concrete examples and context</p> | <p>From KS2 and KS3 students should have learned:</p> <ul style="list-style-type: none"> • to be able to explain why undissolved solids can be separated from a mixture by filtering • that solids remain in the solution when they dissolve • that a dissolved solid can be recovered by evaporation • that the idea that the water we get from our taps has to be treated to make it clean, and then revisits mixtures and dissolving, which pupils will have met in KS2 • about the particle model of matter to explain dissolving, filtering and the conservation of mass, and then looks at saturated solutions, and the effect of temperature on solubility of gases is provided • about the evaporation of water from solutions and the process used to do this in the laboratory, and also how this is applied to the production of salt from brine • about chromatography and its applications • that distillation, including an explanation of why it works in terms of particles; is a technique for separating mixtures • water supplies and desalination, and on fractional distillation • to describe and group rocks by their appearance, textures and ability to soak up water • that dissolved solids are left behind when water evaporates • to describe the processes involved in the weathering and erosion of rocks, and in the transport, deposition, compaction and cementation of rocks • to recall some evidence in sedimentary rocks that can tell us about how they were formed • to know that solids, liquids and gases are made of particles and about the differences between the way particles are arranged in solids and liquids |

What does progression look like in this Big Question?



| Progression Indicator | Description of learning (What matters statements) | Student evidence of progression (Blooms) / Knowledge |
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| Excelling | <p>I can research, devise and use suitable methods of inquiry to investigate my scientific questions.</p> <p>I can use my findings to draw valid conclusions.</p> <p>I can evaluate and identify ways of improving the reliability of data, taking anomalies into account.</p> <p>I can use a range of models to explain and make predictions.</p> <p>I can select relevant scientific knowledge from a range of evidence sources to evaluate claims presented as scientific facts.</p> <p>I can review my own opinions based on new scientific evidence.</p> <p>I can explain how the impact of our actions contribute to the changes in the environment and biodiversity.</p> <p>I can describe the impacts of science and technology, past and present, on society.</p> <p>I can develop my knowledge and skills to support and refine my design decisions in order to produce purposeful outcomes</p> | <p>Describe patterns in their data using a line graph.</p> <p>Use patterns in data to make predictions.</p> <p>Evaluate experimental methods, explaining their strengths and weaknesses.</p> <p>Describe how solubility increases with increasing temperature for most solutes.</p> <p>Explain how distillation works.</p> <p>Describe how the solubility of gases changes with temperature.</p> <p>Explain why the theory of plate tectonics is accepted by most scientists.</p> <p>Describe how fossils can be used to date rocks.</p> <p>Link the different rock formation processes together in the rock cycle.</p> <p>Link the composition of igneous rocks to some of their properties.</p> <p>Describe the idea of metamorphic rocks.</p> |
| Advancing | <p>I can identify questions that can be investigated scientifically and suggest suitable methods of inquiry.</p> <p>I can suggest conclusions as a result of carrying out my inquiries.</p> <p>I can evaluate methods to suggest improvements.</p> <p>I can engage with scientific and technological evidence to inform my own opinions.</p> <p>I can understand how my actions and the actions of others' impact on the environment.</p> <p>I can describe the impacts of science and technology, past and present, in my everyday life.</p> <p>I can apply my knowledge and skills when making design decisions in order to produce specific outcomes.</p> <p>I can consider how my design proposals will solve problems and how this may affect the environment.</p> <p>I can use design communication methods to develop and present ideas, and respond to feedback.</p> <p>I can select and safely use appropriate tools, materials and equipment to construct purposeful outcomes.</p> <p>I can recognise that changes in materials affect their properties and uses under different conditions.</p> <p>I can recognise that our planet provides natural materials and can explain why they may have been processed to make them useful.</p> | <p>Describe how to separate simple mixtures using filtration and chromatography.</p> <p>Present data from investigations as line graphs.</p> <p>Carry out evaporation and distillation safely in the laboratory.</p> <p>Explain what a chromatogram shows.</p> <p>Describe how salt can be obtained from mines.</p> <p>Describe some of the ways in which water is treated before being piped to our homes.</p> <p>Explain how and why a scientific theory becomes accepted.</p> <p>Use the particle model to explain how the speed of cooling affects the crystal sizes in igneous rocks.</p> <p>Use models to explain what happens during metamorphism.</p> <p>State some reasons why people live in areas at risk from earthquakes or volcanic eruptions.</p> <p>Explain how sedimentary rocks can tell us about past conditions.</p> <p>Describe the processes that lead to the formation of sediment.</p> <p>Describe how temperature affects the texture of igneous rocks.</p> <p>Describe how the final texture of a metamorphic rock depends on the pressures and temperatures the rock was subjected to.</p> |
| Securing | <p>I can ask questions and use my experience to suggest simple methods of inquiry.</p> <p>I can recognise patterns from my observations and investigations and can communicate my findings.</p> <p>I can use my knowledge and understanding to predict effects as part of my scientific exploration.</p> <p>I can recognise that what I do, and the things I use, can have an impact on my environment and on living things.</p> <p>I can explore relationships between living things, their habitats and their life cycles.</p> <p>I can observe and describe ways in which materials change when they are mixed together.</p> <p>I can investigate different forms of energy and how it can be transferred.</p> <p>I can identify things in the environment which may be harmful and can act to reduce the risks to myself and others.</p> | <p>Recognise that we need safe drinking water.</p> <p>State that water is treated before being supplied to homes.</p> <p>Recall some ways of conserving water supplies.</p> <p>Recall some examples of the uses of different separating techniques.</p> <p>Describe what happens in dissolving in terms of particles.</p> <p>Explain what a saturated solution is.</p> <p>Recall that solutes that are insoluble in water may dissolve in other solvents.</p> <p>Recall that there have been different theories in the past that have attempted to explain the formation of rocks.</p> <p>Identify some evidence for and against these theories.</p> <p>Recognise that geologists can use evidence from rocks to work out how they were formed.</p> |



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| | <p>I can explore how different component parts work together.</p> <p>I can identify things in the environment which may be harmful and can act to reduce the risks to myself and others.</p> <p>I can explore and describe the properties of materials and justify their uses.</p> <p>I can recognise patterns from my observations and investigations and can communicate my findings.</p> <p>I can safely use a range of tools, materials and equipment to construct for a variety of reasons.</p> | |
| Beginning | <p>I can show curiosity and question how things work.</p> <p>I can explore the environment, make observations and communicate my ideas.</p> <p>I can design while I make and communicate about what I am making.</p> <p>I can safely use simple tools, materials and equipment to construct and deconstruct.</p> <p>I can explore the properties of materials and choose different materials for a particular use.</p> <p>I can identify, follow and begin to create sequences and patterns in everyday activities.</p> <p>I can explore the properties of materials and choose different materials for a particular use.</p> <p>I can identify, follow and begin to create sequences and patterns in everyday activities.</p> <p>I am beginning to follow a sequence of instructions.</p> <p>I can experiment with and identify uses of a range of computing technology in the world around me.</p> | <p>Recognise that we need safe drinking water.</p> <p>Recall that mixtures can be separated.</p> <p>Recall that people live in areas prone to earthquakes or volcanic eruptions in spite of the dangers</p> <p>Observe the texture of rocks.</p> <p>Make and record observations carefully.</p> |

| Authentic learning experiences (Local / National / International) | Skills (Literacy / Numeracy / DCF) / Cross Curricular links |
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| <p>Students will consider three examples of the role of water in the natural geography of an environment.</p> <p>Local: students will consider pollution levels in the river Dee due to the Chester-based Welsh Water sewage work overflows. They will consider examples of local industry in Flintshire including industrial brewing and baking and the role of water in large scale traditional industry. They will also compare the production of salt from Cheshire salt mining and sea salt extraction from Ynys Mon.</p> <p>National: Students will consider the balance of the needs for drinking water for large population centres and traditional Welsh language communities in North Wales including Cofiwch Dreweryn.</p> <p>International: Global water shortage will be an increasing issue with increase in global population and issues relating to climate change and students will be introduced to ideas about water use on a global scale.</p> | <p>Numeracy</p> <ul style="list-style-type: none"> Students will measure mass and volume. Students will use a range of quantities and units. Students will complete simple calculations to show mass conservation. Students could calculate concentration, volume and density. <p>Literacy</p> <ul style="list-style-type: none"> Students will follow a series of instructions to complete a procedure. Students will develop extended writing responses to describe and explain scientific ideas. <p>Cross-curricular</p> <ul style="list-style-type: none"> Many of the concepts in this topic overlap with the Geography curriculum. |

| Assessment (How will we know that students have learnt what we taught them?) | |
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| Formative assessment: | Summative assessment: |
| Students will be provided with a range of assessment techniques throughout the topic to give them | End of 'Biq Question' test x2 (mid topic and end of topic) |



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| immediate feedback on a range of skills and knowledge required to progress in this topic in line with the whole school assessment policy. | |
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Evaluation (to be completed 2024)

| Strengths | Areas for Development | Pupil Voice |
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