

KS3 Chemistry – Rocks and their Properties

Subject curriculum intent:	<p>To develop in our students:</p> <ul style="list-style-type: none"> • An enjoyment of Science by providing relevant, interesting and challenging experiences and activities. • Observational skills, by looking for patterns and contrasts. • An inquiring mind and a logical approach to problem solving. • The ability to draw conclusions from simple experiments and, where appropriate, to devise suitable experiments for further investigations. • Communication skills in speaking and listening, written, diagrammatic and symbolic forms. • Co-operation and a respect for others by being able to work as part of a team – the development of appropriate social skills. • Confidence in their own abilities. • A respect for the environment and a careful use of resources. • An interest in the world about them and a greater understanding of it. 		
End of KS3 intent/outcome	End of KS4 intent/outcome	End of KS5 intent/outcome	
Students will build on their knowledge of science through the different areas – biology chemistry and physics. Students will ‘work scientifically’ to achieve the goals of each topic area they encounter.	Students will continue to develop their scientific knowledge through the different areas – biology, chemistry and physics. Students will ‘work scientifically’ to achieve the goals of each topic area they encounter. Students will be able to relate their scientific experiences to everyday life and have an understanding that science is all around them.	N/A	
Intent for this topic:	<p>Students will explore different rocks and be able to describe and classify their properties. Students will learn about different types of rocks and how they are formed. Pupils will have an awareness of the rock cycle and how rocks can change. Some pupils will be able to identify and explain different stages of the rock cycle. Students will explore soil and look at the differences of the different layers. Pupils will learn what a fossil is and how fossils are formed.</p> <p>Students will ‘work scientifically’ to achieve these goals, learning the key features of scientific enquiry; observing over time, pattern seeking, identifying, classifying, investigating (fair tests) and researching.</p>		
Core vocabulary needed for this subject/topic:	<p><u>Subject:</u> Biology, Chemistry, Physics Observe, pattern, identifying, classifying, investigating, fair test, researching</p> <p><u>Topic:</u></p>		

	Rocks, soil, properties, layers, permeable, impermeable, magma, lava, sediment, Type of rocks: igneous rocks, sedimentary rocks, metamorphic rocks Rock cycle – weathering, erosion, transportation, deposition, burial and compression, heat and pressure, uplift, melting, cooling, exposure. Fossils – fossilisation, planetology, erosion
Vocabulary pupils will have accessed in other topics or subject areas:	Rocks, soil, properties, cycle, melting, cooling, layers, lava, fossils
Key vocabulary taught within this topic:	Rocks, soil, properties, layers, permeable, impermeable, magma, lava, sediment, Type of rocks: igneous rocks, sedimentary rocks, metamorphic rocks Rock cycle – weathering, erosion, transportation, deposition, burial and compression, heat and pressure, uplift, melting, cooling, exposure. Fossils – fossilisation, planetology, erosion

Prior knowledge: what pupils may already have studied

Key stage	Subject	Topic title	Term/year taught	Content/What might pupils already know?
KS3	Science	Properties of materials	Spring 1/Year 2	Pupils may have learnt what a property is and how to describe different properties.
KS3	Science	Solids, gases and liquids	Spring 1/Year 3	Pupils may have identified rocks as a solid and know some properties of a solid.
KS3	Science	Changing materials	Spring 2/Year 3	Pupils may be aware of how materials can change by heating and cooling.
KS3	Science	Earth and its atmosphere	Spring 1/Year 1	Pupils will have learnt about different rocks in the Earth's atmosphere.
KS3	Geography	Restless earth: Earthquakes and volcanoes	Autumn 2/Year 2	Pupils may have learnt about volcanoes and be aware of how they erupt and what magma is.
KS3	Geography	Weather and climatic variation	Autumn 2/Year 1	Pupils may have some understanding of what erosion is and how weather can cause this.

Links to other subjects: Geography

Equality, Diversity and Inclusion:

Mary Anning - supplied fossils to palaeontologists, collectors and museums, as well as to the visitors to her shop in.

Friedrich Mohs - German mineralogist who devised the Mohs scale, by which minerals are classified in order of relative hardness.

	<u>OU P Steps 5-6</u>	<u>OU P Steps 7-8</u>	<u>OU Step 1</u>	<u>OU Step 2</u>	<u>OU Step 3</u>
<u>Subject specific knowledge</u>	<p>Knows rocks have different properties.</p> <p>Knows where to find rocks.</p> <p>Knows where to find soil.</p> <p>Knows rocks change shape over time.</p> <p>Knows rain can change the shape of rocks.</p> <p>Can identify a fossil from a range of pictures/objects.</p>	<p>Can identify some properties of a rock.</p> <p>Can use everyday words to describe rocks e.g. shiny, rough.</p> <p>Can label the different types of rocks using symbols - igneous rocks, sedimentary rocks and metamorphic rocks.</p> <p>Knows where to find rocks and soil in the environment.</p> <p>Knows soil has different layers.</p> <p>Knows that rocks change during the rock cycle.</p> <p>Can name 2 ways rocks change during the rock cycle.</p> <p>Knows what a fossil is.</p> <p>Knows fossilisation happens in different stages.</p>	<p>Can identify and describe rocks based on their properties.</p> <p>Knows that rocks and soil belong to the group of natural materials.</p> <p>Knows the difference between permeable and impermeable.</p> <p>Knows that rocks have different names - igneous, sedimentary and metamorphic.</p> <p>Can name one example of a manmade rock.</p> <p>Knows soil has different layers.</p> <p>Can explain that the rock cycle shows how rocks change.</p> <p>Can name 4 ways rocks change during the rock cycle.</p> <p>Can explain what a fossil is.</p>	<p>Knows that rocks and soil belong to the group of natural materials.</p> <p>Can identify several properties of rocks.</p> <p>Can explain the difference between permeable and impermeable.</p> <p>Knows the names of different rocks - igneous, sedimentary and metamorphic.</p> <p>Can explain how one of the different rocks are formed.</p> <p>Can explain what the rock cycle is.</p> <p>Can name 6 ways rocks change during the rock cycle.</p> <p>Can explain what a fossil is.</p> <p>Can explain the process of fossilisation.</p>	<p>Knows what natural minerals are and can give examples.</p> <p>Can identify several properties of rocks.</p> <p>Can explain the difference between permeable and impermeable.</p> <p>Can give examples of permeable and impermeable rocks.</p> <p>Knows how to identify different rocks.</p> <p>Knows the names of different rocks and how they are different - igneous, sedimentary and metamorphic.</p> <p>Can explain how the different types of rock are formed.</p> <p>Can explain how the rock cycle involves changing the three types of rock from one to another.</p>

			Knows fossilisation happens in different stages.		<p>Can explain each stage of the rock cycle.</p> <p>Can explain what a fossil is.</p> <p>Can explain the process of fossilisation using scientific vocabulary e.g. erosion, sediment.</p>
<u>Subject specific skills</u>	<p>Is able to examine different rocks.</p> <p>Is able to describe a rock using symbols.</p> <p>Is able to sort rocks based on their properties.</p> <p>Is able to find rocks in their local environment.</p> <p>Is able to observe what happens when water is poured onto different rocks.</p> <p>Is able to sort rocks and fossils.</p> <p>Is able to match fossils to the animal.</p>	<p>Is able to identify different rocks using symbols.</p> <p>Is able to describe different rocks using key words.</p> <p>Is able to investigate the properties of rocks.</p> <p>Is able to observe the effect of water on rocks.</p> <p>Is able to find rocks in their environment.</p> <p>Is able to identify where a rock has been used e.g. for building.</p> <p>Is able to label a diagram of the rock cycle using symbols.</p>	<p>Is able to identify different rocks.</p> <p>Can sort rocks using given criteria e.g. sort rocks into rough and smooth.</p> <p>Is able to sort rocks into permeable and impermeable.</p> <p>Is able to label a diagram of the rock cycle using a symbol word bank.</p> <p>Is able to label the layers of soil.</p> <p>Is able to identify difference in the layers of soil.</p> <p>Is able to sequence the stages of fossilisation and is beginning to</p>	<p>Is able to suggest a criteria to sort different rocks.</p> <p>Is able to identify permeable and impermeable rocks through observation.</p> <p>Is able to label a diagram of the rock cycle using a word bank.</p> <p>Is able to label and explain the differences of different layers of soil.</p> <p>Is able to identify some differences between different types of soil.</p> <p>Is able to explain the different stages of hoe fossils are formed.</p>	<p>Is able to create a criteria to classify different rocks.</p> <p>Is able to suggest ways to test if a rock is permeable or impermeable.</p> <p>Is able to label a diagram of the rock cycle.</p> <p>Is able to compare different types of soil.</p> <p>Is able to explain how fossils are formed.</p> <p>Draws and labels diagrams.</p> <p>Is able to make models following a written set of instructions.</p>

	<p>Is able to follow a set of demonstrations to make models.</p> <p>Is able to follow a set of demonstrations to carry out a simple investigation.</p>	<p>Is able to label the different layers of soil using symbols.</p> <p>Is able to suggest an animal the animal of the fossil.</p> <p>Is able to sequence the stages of fossilisation.</p> <p>Is able to make models following a picture method.</p> <p>Is able to label parts of the rock cycle using symbols.</p> <p>Is able to make a prediction from a choice of 3 using symbols.</p> <p>Is able to follow a picture method to carry out a simple investigation.</p> <p>Is able to identify one thing that has changed when completing a fair test.</p> <p>Identifies the correct result in a table.</p>	<p>explain how fossils are formed.</p> <p>Is able to identify different fossils.</p> <p>Is able to make models following a word and picture method.</p> <p>Is able to link their model to a concept.</p> <p>Is able to select an appropriate prediction from a given choice.</p> <p>Is able to follow a word and picture method to carry out a simple investigation.</p> <p>Is able to suggest what to change when completing a fair test.</p> <p>Is able to record results in a simple table.</p> <p>Analyses results in the form of tables, simple bar graphs and a brief descriptions using key words or sentence blanks.</p>	<p>Is able to make models following a written set of instructions.</p> <p>Is able to use their model to explain a concept.</p> <p>Is able to make a prediction linked to their investigation.</p> <p>Is able to follow a written set of instructions to carry out a simple investigation.</p> <p>Is able to explain why their investigation included a fair test.</p> <p>Is able to record results in a suitable table.</p> <p>Is able to record results in the form of a simple bar graph.</p> <p>Analyses results in the form of tables, simple bar graphs and a brief description.</p>	<p>Is able to suggest improvements to their model.</p> <p>Is able to use their model to explain a concept.</p> <p>Is able to make predictions.</p> <p>Is able to follow a written set of instructions to carry out a simple investigation.</p> <p>Is able to design an experiment to include a fair test.</p> <p>Is able to record results in a suitable table.</p> <p>Analyses results in the form of tables, simple bar graphs and a brief description.</p> <p>Is able to draw conclusions from their results.</p>
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**Suggested
Activities**

Rocks

- Describe the properties of rocks.
- Sort rocks based on their properties.
- Find rocks in the environment.
- Look at how different rocks are formed - igneous rocks, sedimentary rocks, metamorphic rocks
- Sort different rocks into igneous, sedimentary, metamorphic
- Label the rock cycle & what happens at each stage – weathering, erosion, transportation, deposition, burial and compression, heat and pressure, uplift, melting, cooling, exposure.
- Look at video clips or other secondary sources about the uses of rocks.
- Using hand lenses to observe what rock samples look like. Pupils can record the colour, whether it is rough or smooth, whether they can see crystals and if it is shiny or dull. The information can be put on “Rock Data” cards.
- Using microscopes (light or digital) to observe different types of rocks.
- Using “Bioviewers” to look at various rock types.
- Test for hardness of rocks by scratching – scratched by fingernail are very soft, scratched by iron nail are soft, scratched by steel knife are hard, cannot be scratched by steel knife very hard. Risk assessment needed when using sharp objects with class. Take care that the particles do not go in the pupils’ eyes.
- Test the rocks to see if they break easily – wrap in cloth, put it on floor and push down with heel to see if it breaks.
- Test the rocks to see if they soak up water – use a pipette to drop water on a sample and observe
- Demonstration of plastic bottle filled with water – put in the freezer to show expansion of water on freezing.
- Use of secondary sources to show how the wind can carry sand and result in weathering of rocks.
- Visit or use of photographs to observe weathered surfaces.
- Show the effect of dilute hydrochloric acid (or lemon juice) on limestone and marble. Pupils must wear eye protection. Use dilute acid no stronger than 1M.
- Demonstrate the formation of metamorphic rocks, warm up three balls of playdough, flatten them and roll them together. The layers cannot be separated.
- Look at the crystals and bubbles in igneous rocks.
- Demonstrate the formation of sedimentary rocks by pouring a mixture of polyfilla powder and sand down a long tube into a tank of water and allowing to settle. Pupils can draw the resulting layers.
- Sequencing activity (words, pictures or both) to explain how sedimentary rocks form.
- Use of video clips, internet images and other secondary sources to identify rock formations which are sedimentary.

Soil

- Look at the different layers of soil.
- Compare and describe different types of soil.
- Pupils dig a hole (quite deep – 60cm or so) and observe changes in soil colour, size of particles and presence of rocks and stones. Pupils must wash hands after handling soil unless gloves are used.
- Shake soil up in a jam jar with water and allow to settle. Draw results and compare soils from different areas – sandy, clay etc.
- Test different soils to see how much water passes through them and how much is absorbed.

	<ul style="list-style-type: none"> • Compare the rate at which water passes through different type of soil. <p>Fossils</p> <ul style="list-style-type: none"> • Match fossils to the animals. • Make fossils. • Dig for fossils in sand. • Sequence/explain the stages of fossilisation. • Use hand lenses to look for fossils and layers in limestone.
<p><u>Possible Investigations/ Working Scientifically</u></p>	<ul style="list-style-type: none"> • Observe what happens when water is poured onto different rocks. • Which rocks are permeable and impermeable. • Does soil contain water? • How much water do different rocks absorb? • How quickly do different sediments settle? Use sand, clay and gravel in a jar of water. • Is sand carried as far as gravel? • Does the distance sand travels depend on the width of the channel?
<p><u>Personal development</u></p>	<p><u>Problem solving</u> Investigations and matching exercises</p> <p><u>Communication skills</u> Working as pairs in investigations, asking and answering questions</p> <p><u>Self-belief</u> Learning new skills, practising them and demonstrating them.</p> <p><u>Self-management</u> Working with new equipment</p> <p><u>Teamwork</u> Working as groups to solve problems or find out new information</p>
<p><u>Resources</u> https://www.bbc.co.uk/bitesize/subjects/z2pfb9q https://www.purplemash.com/#tab/pm-home/science https://central.espresso.co.uk/espresso/modules/subject/index.html?subject=862674&grade=ks1&&source=espresso-home-mixedtopnav-menu-key-stage-1 Twinkl Youtube Resource folder on the shared area.</p>	
<p><u>Evidencing Work</u> All work / evidence sheets need to be printed off (where appropriate levelled in accordance with the rubric), students need to self-assess and work needs to be put in student folders.</p>	

RRSA Articles:

Article 13 – I have the right to find and share information.

Article 17 – I have the right get information in lots of ways, so long as it's safe.

Article 29 - I have the right to an education which develops my personality, respect for others' rights and the environment.