Imagine, Believe, Achieve

Springdale First School

Year 3 / Science / Rocks and soils

Children's prior learning in this area

In Year 1: distinguish between an object and the material from which it is made identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock describe the simple physical properties of a variety of everyday materials; compare and group together a variety of everyday materials on the basis of their simple physical properties.

In Year 2: identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses

Children have learnt to identify the properties of familiar everyday materials and to use these properties to compare and group materials. This prepares the children for identifying properties of less familiar material – rock - and to understand that rocks that can be grouped and compared. They will embed their knowledge of physical properties from KS1 and deepen their understanding. They will learn some new properties too. In Year 2, the children learnt that materials are selected for particular uses depending on their suitability. This will be extended as the children learn that rocks and soils can be selected for different purposes. The understanding of properties of materials including rocks readies the children for understanding that everything is made of matter (material). In KS1 and Yr 3, the materials have all been in the state of a solid (other than water, which is observed as a material in Yr 1). In Year 4, children will learn that matter can change states from solid, liquid and gas.

Cultural Capital Opportunities

Visiting Scientist – showing their work in soils

Visiting local sites along the Jurassic Coast – e.g. Kimmeridge Bay (local fossil beach and fossil museum) Lyme Regis (fossil beach and home of Mary Anning)

Mary Anning

Key vocabulary and glossary

rock

mineral

soil

rough

smooth

hard

soft

permeable

impermeable

durable

shiny

dull

crystals layers

fossil

extinct

organic matter

decayed remains

Enquiry Question Do all rocks look and feel the same?	**Enquiry Question** Are all rocks hard and durable?	**Enquiry Question** Are all rocks impermeable?
Working scientifically skill: observe closely; interpret results **Enquiry type:** Identifying, grouping and classifying	**Working scientifically skill:** Drawing conclusions; evaluate an enquiry **Enquiry type:** Comparative and fair testing	**Working scientifically skill:** Drawing conclusions; evaluate an enquiry **Enquiry type:** Comparative and fair testing
Children will know how to: compare and group together different kinds of rocks on the basis of their appearance and properties **Children will know:** A mineral is a solid, natural substance with a crystal structure. A rock is a natural, solid material made up of more than one mineral. Stones and boulders are rocks. These words are to do with size not type. Some rocks are formed by magma or lava cooling and hardening. Some are formed by layers of sediment (broken down, weathered rock) being pressed together). (Sedimentary rock is a useful term for later when learning about fossils. Igneous and metamorphic are not necessary). **Children will know:** Rocks can be classified according to their appearance. Pupils may refer to vocabulary such as different colours, shiny, sparkly, shimmery, grainy, spotted, speckled, stripy, streaked. **Children will know:** Rocks can be classified according to their texture. Pupils may refer to vocabulary such as smooth, rough, jagged, hard, softer, powdery, crumbly. Children should observe the rocks closely. ***Check:*** *Cloze procedure.* ***Practise:*** *Identify differences and similarities by grouping rocks using different Carroll diagrams.* ***Apply:*** *Identify and name some common rocks by referring to descriptions of characteristics, explaining orally which characteristics have caused them to identify a rock.* ***Deepen:*** *Compare two rocks in a pre-given table – similarities and differences – texture, appearance, formation.*	**Children will know:** Hard is something that is rigid and stiff. It cannot easily be broken. Durable is something that is strong and lasts a long time. (Hard materials are generally durable but you can have durable items that are not hard. Show how a soft item, e.g. lycra can be durable). **Children will know how to:** compare and group together different kinds of rocks on the basis of their properties **Children will know how to:** draw conclusions and evaluate the enquiry. With help, children should look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions. ***Practise:*** *Practise vocabulary of durable perhaps by sorting/ordering similar materials – e.g. give tissue paper, newspaper, printer paper from least to most durable. Practise vocabulary of hard perhaps by ordering different materials from soft to hard, referring to the definition – rigid and stiff.* ***Apply 1:*** We need to choose a rock for a kitchen worktop. We need a rock that is hard and won't scratch. Choose 5 rock samples. Test each rock by scratching it with a nail. Give each rock a score 1 – 5. **Deepen 1:** Show a model conclusion (written by ER) for the hardness/scratch test that follows this success criteria: Answer the question by using the results as evidence. Explain why this happened using scientific knowledge. Identify any flaws that might have affected the results. Suggest improvements to make the investigation more reliable. **Apply 2:** We need to choose a hard wearing, durable rock that we can use for ramps at a skate park. The rock needs to be durable as many skateboards and scooters will be riding over it each day. Choose 5 rock samples. Test each rock by gently rubbing each rock with a piece of sandpaper. The more rock 'dust' that comes away from the rock, the less durable it is. **Deepen 2:** Model/share-write conclusion for durability enquiry. Children then write their own version of the conclusion.	**Children will know:** If a material is permeable, it means liquids can pass through. Impermeable means liquids cannot pass through. **Children will know how to:** compare and group together different kinds of rocks on the basis of their properties **Children will know how to:** draw conclusions and evaluate the enquiry. ***Practise:*** *Circle the objects that are permeable. Write a defintion for permeable.* ***Apply:*** We need to choose a rock that will be suitable to be the roof of a new building. It needs to be waterproof. Choose 5 rock samples. Test each rock by gently dripping water onto the rock using a pipette. If the rock 'soaks' up the water, then it is permeable and not waterproof. ***Deepen:*** *AFL opportunity: Children independently write up own concluson and evaluation of enquiry following success criteria from last lesson. Use this assessment to support learning later in the unit when drawing conclusions again.*

Enquiry Question How are fossils formed?	**Enquiry Question** Why is Mary Anning a significant person in geology?	**Enquiry Question** What are soils? Which soils do plants grow well in?
Working scientifically skill: Present and report findings **Enquiry type:** Research using secondary sources	**Working scientifically skill:** Present and report findings **Enquiry type:** Research using secondary sources	**Working scientifically skill:** observe closely; interpret results **Enquiry type** Identifying, grouping and classifying
Children will know: Some rocks contain fossils. Fossils are formed when things that have lived are trapped in rock. A fossil is the preserved remains or traces of a dead animal or plant. It's very rare for living things to become fossilised. Usually after most animals die their bodies just rot away and nothing is left behind. However, under certain conditions, a fossil can form. After an animal dies, the soft parts of its body **decompose** leaving the hard parts, like the skeleton, behind. This becomes buried by small particles of rock called **sediment**. As more layers of sediment build up on top, the sediment around the skeleton begins to compact and turn to rock. The bones then start to be dissolved by water seeping through the rock. This leaves a mould fossil. Minerals in the water replace the bone, leaving a **rock replica** of the original bone called a fossil. (Think of a jelly). This is called a cast fossil. (60) WHAT'S A FOSSIL? - YouTube (this video covers the sticky knowledge). **Children will know how to:** identify changes related to simple scientific ideas and processes. **Children will know how to:** present and report findings appropriately for its purpose and audience. ***Practise:*** *Children use playdough and toy dinosaurs to act out the process of fossilisation – one colour playdough can be the mould fossil and another colour can be the cast fossil as teacher describes the process of mould and cast.* ***Check:*** *true/false statements on sticky knowledge.* ***Apply:*** *In pairs, one child describes the mould/cast fossilisation process whilst the other models it with the playdough. Then switch. Have sequencing cards (images from video) alongside some key vocabulary for children to refer to.* ***Deepen:*** *Provide children with a purpose for presenting their findings on how fossils are formed when trapped in rock – e.g. to present to parents/younger class. Consider which ways of presenting would be suitable choices. Children can choose from the suitable selection and create presentation.*	**Children will know:** Mary Anning was a famous fossil hunter born in 1799. She lived in Lyme Regis, Dorset. Mary's father taught her and her brother Josephh how to remove fossils from rock. Mary and her brother sold fossils to earn money as they were poor. They made an amazing discovery – the first complete fossil of an Ichythyosaurus (fish-lizard). Another time, Mary found a the first complete Plesiosaur. Many of her fossils were put on display at the British Museum. In her time, Mary wasn't taken seriously as a scientist because she was a woman and from a poor background. She wasn't credited for her discoveries when scientists wrote about them. Now she is recognised as a pioneer of palaeontology and is still remembered as one of the greatest fossil hunters in history. **Children will know how to:** present and report findings appropriately for its purpose and audience. ***Practise:*** *I do/we do research of some key facts.* ***Apply:*** *Research facts about Mary Anning.* ***Deepen:*** *Present a fact-file about Mary Anning for significant scientist display.*	**Children will know:** Soil is made up of tiny particles of rock, dead and decaying plants and animals, air and water. There are different types of soil. The type of rock, size of rock pieces and the amount of organic matter affect the property of the soil. Sandy soil has larger particles than other soils, meaning it has space to hold more air. Clay and silt have smaller particles and can hold more water. The darker brown or black the soil, the more organic matter is in the soil and therefore the more fertile it is. **Children will know how to:** Identify differences, similarities or changes related to simple scientific ideas and processes. Explain which characteristics have caused them to identify or classify objects by indicating similarities or differences. **Children will know how to:** observe closely to observe particle size and colour. Using sense of touch for texture using the ribbon test. **Children will know how to:** observe closely using a magnifying glass. hold the magnifying glass close to eye. Then move slowly towards the object until it is in focus. (46) How to Use a Magnifying Glass? - YouTube ***Practise 1:*** *Cloze procedure/matching.* ***Practise 2:*** *I do/we do practise using a magnifying glass and texture ribbon test using one soil type.* ***Apply:*** *a) classify soils by colour – will plants grow well/not grow so well b) classify soils by texture – ribbon test – which will plants grow best in?* ***Deepen:*** *In written work, compare two of the soils, explaining which would be a good soil for growing plants and why and which wouldn't and why.*

Enquiry Question Which soil is best for a playing field?

Concept Observe closely, take measurements, draw conclusions, evaluate an enquiry
Enquiry type Comparative and fair testing

Retrieval from prior lesson in unit: If a material is permeable, it means liquids can pass through. Impermeable means liquids cannot pass through.

Children will know: The type of rock, size of rock pieces and the amount of organic matter affect the property of the soil and therefore soil can be chosen for different purposes – e.g. growing different types of plants, for recreational use.

Children will know how to: taking systematic, careful observations and measurements of liquid that passed through in millilitres.

Children will know how to: draw conclusions and evaluate the enquiry.

Practise 1: *matching soil description to a purpose.*

Practise 2: *Practise reading measurements of water in measuring cylinders. Also practise reading measurements on diagrams of water in measuring cylinders. Practise monitoring time on stopwatch facility on tablets. Practise worksheet. Circle the times you will take a measurement.*

Apply: Children work in small groups to carry out soil permeability investigation, focusing on taking systematic, careful observations and measurements of liquid that passed through in millilitres.

Deepen: Write conclusion with evaluation of enquiry. Targeted support to children who were not successful in drawing conclusions and evaluating earlier in the unit.