YEAR 3: AUTUMN 1 – OCEAN EXPLORERS: DESTINATION UK

SCIENCE: ROCKS, SOIL AND FOSSILS

UNDERSTAND, DESCRIBE AND EXPLAIN:

To understand the formation and properties of rocks

Igneous:	***Metamorphic:***	***Sedimentary:***	***Tectonic plates***	***Earth's crust***	***Erosion***	***Weathering***
Granite ***Basalt***	***Marble*** ***Slate***	***Limestone*** ***Sandstone***	***Volcano***	***Sediment***	***Crystals***	***Ore***
Molten rock/ Magma	***Metamorphosed***	***Compacting***	***Rock cycle***	***Rock hardness***	***Permeable***	***Impermeable***

Learning links:

Geography:

Y3: Coastal Erosion
Erosion/Abrasion/ Weathering/Sediment

Y4: Mountains & Volcanoes
Igneous rocks/Earth's crust/Minerals/Magma

Y5: Rivers
Erosion/Abrasion/ Attrition/Sediment

Y6: Earthquakes
Earth's crust/Tectonic plates

Learning Links:

Science:

Y5: Properties of materials
Hardness and Porosity/ Melting/Molten

ROCKS:

A ***rock*** is a ***solid*** made up of lots of ***different minerals***. Rocks are generally ***not uniform*** or made up of exact structures that can be described by scientific formulas. Scientists generally ***classify rocks*** by how they were made or ***formed***. There are ***3 major types*** of rocks:

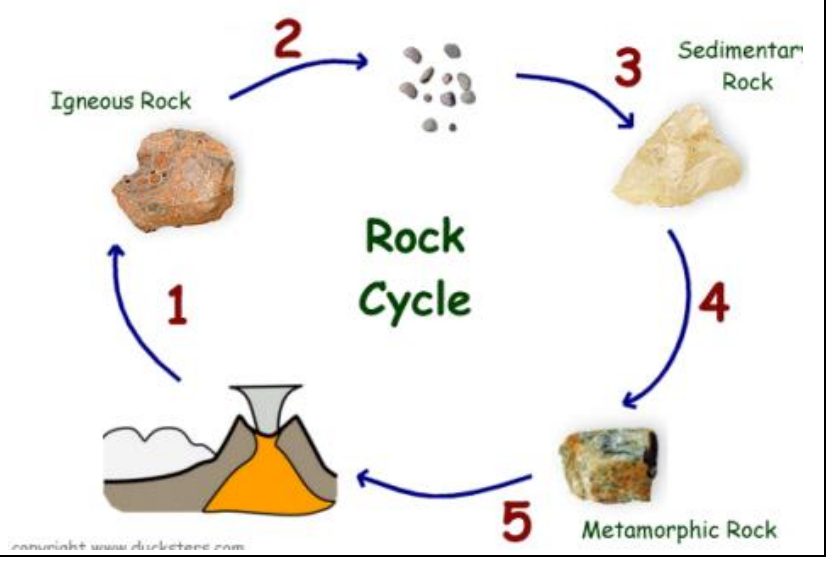
Metamorphic Rocks are formed by great ***heat and pressure***. They are generally found ***inside the Earth's crust*** where there is enough heat and pressure to form the rocks. ***Metamorphic rocks*** are often made from other types of rock. For example, shale, a sedimentary rock, can be changed, or ***metamorphosed***, into a metamorphic rock such as slate or gneiss. Other examples of metamorphic rocks include marble, anthracite, soapstone, and schist.

Igneous Rocks are formed by ***volcanoes***. When a ***volcano*** erupts, it spews out ***hot molten rock*** called ***magma*** or lava. Eventually, the ***magma*** will cool down and ***harden***, either when it reaches the Earth's surface or somewhere within the crust. This ***hardened magma*** or lava is called igneous rock. Examples of igneous rocks include basalt and granite.
Sedimentary rocks are formed by years and years of ***sediment compacting together*** and becoming hard. Generally, something like a stream or river will carry lots of small ***pieces of rocks and minerals*** to a larger body of water. These pieces will ***settle*** at the bottom and, over a really long time (perhaps ***millions of years***), they will ***form into solid rock***. Some examples of sedimentary rocks are shale, limestone and sandstone.

The properties of rocks:
Depending on the type of rock and how it was formed, rocks will have different properties:
Permeable: Rocks which allow water to pass through.
Impermeable: Rocks which do not allow water to pass through.
Hardness: This varies between rocks. ***Some rocks*** are much, much ***harder than others***. If a rock can scratch glass, it's harder than glass. If it can ***scratch another rock***, it's harder than that rock.

The Rock Cycle:
Rocks are ***constantly changing*** in what is called the ***rock cycle***. It takes ***millions of years*** for rocks to change. Here is an example of the rock cycle ***describing*** how a rock can change from ***igneous to sedimentary to metamorphic*** over time:

1. Melted rock or ***magma*** is sent to the earth's surface by a ***volcano***. It ***cools*** and forms an ***igneous rock***.
2. Next, ***erosion, weathering, abrasion, attrition*** etc will ***slowly break up*** this rock into small pieces of ***sediment***.
3. As ***sediment builds up and hardens*** over years, a ***sedimentary rock*** is formed.
4. Slowly, this sediment rock will get ***covered with other rocks*** and end up ***deep*** in the ***Earth's crust***.
5. When the ***pressure and heat get high*** enough, the ***sedimentary rock*** will ***metamorphose*** into a ***metamorphic rock*** and the cycle will start over again.



UNDERSTAND, DESCRIBE AND EXPLAIN:

To understand the formation and properties of soil

Learning links:
Geography:
Y4: Mountains & Volcanoes Agriculture/Fertile soil
Y5: Rainforest Fertile soil/Climate/ Agriculture

Soil	***Mud***	***Silt***	***Mineral***	***Organic Material***	***Living organism***	***Topography***	***Climate***
Disintegrate	***Texture***	***Structure***	***Density***	***Temperature***	***Colour***	***Consistency***	***Porosity***

Organic/Humus layer	***Topsoil 'A' layer***	***Subsoil 'B' layer***	***Parent material 'C' layer***	***Illuviation***

SOIL:

What is soil and how is it formed?

Soil is the loose upper layer of the Earth's surface where plants grow. Soil consists of a mix of ***organic material*** (decayed plants and animals) and broken bits of rocks and minerals. ***Soil is formed*** over a long period of time. It can take up to 1000 years for just an inch of soil to form.

The ***type of soil*** that is created depends on the following things:

- ***Living organisms*** - This includes organisms such as ***plants, fungi, animals***, and ***bacteria***.
- ***Topography*** - This is the relief or ***slope of the surface*** of land where the soil is forming.
- ***Climate*** - The ***overall climate*** and ***weather*** where the soil is forming.
- ***Parent material*** - The parent material is the ***minerals and rocks*** that are ***slowly disintegrating*** to form the soil.

The properties of soil:

Soil is often described using several ***characteristics*** including:

Texture	***Structure***	***Density***	***Temperature***	***Colour***	***Consistency***	***Porosity***

One of the most ***important properties*** of soil is the ***texture***. ***Texture*** is a ***measure*** of whether the soil is more like ***sand, silt, or clay***. The ***more like sand*** a soil is the ***less water*** it can hold. On the other hand, the ***more like clay*** a soil is, the ***more water*** it can hold.

Soil Horizons:

Soil is made up of many ***layers***. These layers are often called ***horizons***. Depending on the type of soil there may be ***several layers***.
There are ***3 main horizons*** (called ***A, B, and C***) which are ***present in all soil***.
The ***layers/horizons*** are:

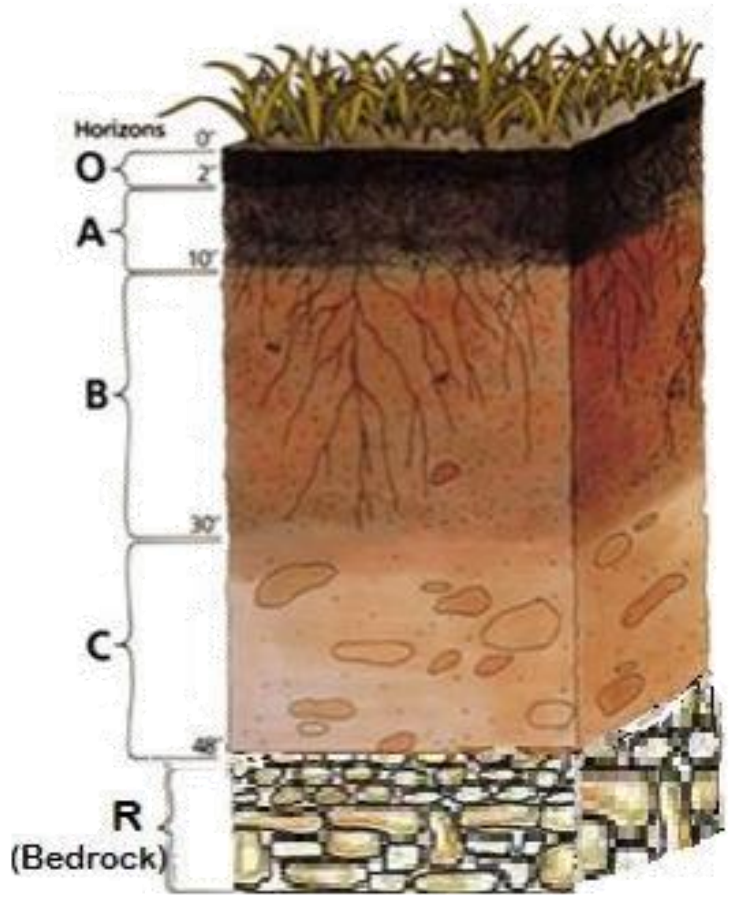
Organic/Humus - The organic/humus layer is a ***thick layer of plant remains*** such as leaves and twigs.

Topsoil - The ***"A"*** horizon is a ***fairly thin*** layer (5-10 inches) composed of ***organic matter and minerals***. This layer is the ***primary layer*** where ***plants and organisms live***.

Subsoil - The ***"B"*** horizon. This layer is made primarily of ***clay, iron, and organic matter*** which accumulated through a process called ***illuviation***.

Parent material - The ***"C"*** horizon is called the parent material because the ***upper layers*** developed from this layer. It is made up ***mostly of large rocks***.

Bedrock - The ***bottom layer*** is ***several feet below*** the surface. The bedrock is made up of a ***large solid rock***.



UNDERSTAND, DESCRIBE AND EXPLAIN:

To understand the formation and properties of fossils

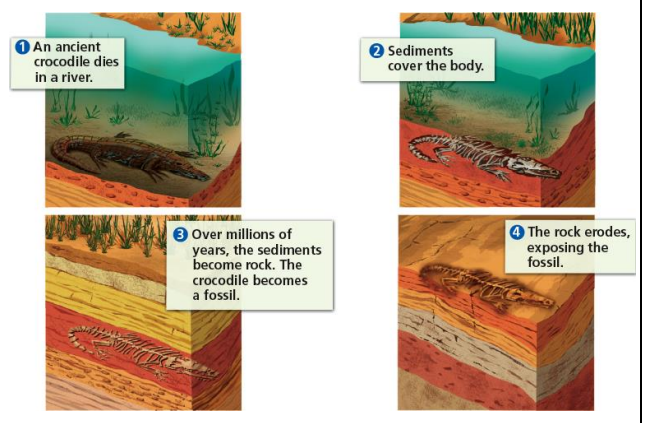
Learning links:
Geography:
Y3: Coastal Erosions Sedimentary Rock

Learning links:
Science:
Y6: Evolution Fossils/Evidence

Fossils	***Preserve(d)***	***Sedimentary Rock***	***Living Organism***	***Minerals***	***Body fossils***	***Trace fossils***

Amber fossilisation	***Carbonization***	***Casts and moulds***	***Freezing***	***Mummification***

FOSSILS:



What are fossils and how are they formed?

A ***fossil*** is the ***preserved*** remains or impressions of a ***living organism*** such as a plant, animal, or insect. Some fossils are very old. Studying fossils helps scientists to learn about the past history of life on Earth. Fossils are found all over the world. Most fossils are found in ***sedimentary rock*** such as shale, limestone and sandstone.

There are two main types of fossils:

Body fossils - Body fossils are fossils where some portion of the ***actual organism's body remains*** as part of the fossil. This might be a tooth or piece of bone.

Trace fossils - Trace fossils are fossils where there ***isn't any actual part*** of the original organism, but "***traces***" of the organism are ***preserved*** in ***rocks*** and ***minerals***. There are many different types of ***trace fossils*** including ***moulds, animal tracks, casts, and impressions***.

There are a number of ways that fossils may form:

Amber - ***Full body insect fossils*** can be found preserved in ***hardened tree sap*** called ***amber***. These fossils can ***remain preserved*** in amber for millions of years.

Carbonization is when all the ***elements*** of the organism are ***dissolved*** except for the carbon. The ***carbon leaves a residue*** which shows an ***outline of the organism***.

Casts and moulds - A cast or a mould fossil is an ***impression of a living organism***. They are made when an ***organism dissolves*** in the Earth and ***leaves a hollow mould*** behind. The ***mould*** is then ***filled in by minerals*** leaving something like a ***statue*** of the organism behind.

Freezing - Some fossils are ***preserved in ice***. As long as the ice doesn't melt, the fossil may be ***preserved for thousands of years***. Large fossils such as the ***woolly mammoth*** have been discovered in the ***glaciers of the Arctic***.

Mummification - In really ***dry areas,*** a fossil may be formed through ***mummification***. This is when the dead organism ***quickly dries out***. Because there is ***little moisture***, the remains of the organism can be ***preserved for a long time*** leaving a fossil.

Where are fossils found?

Fossils are found ***all over the world***. ***Most*** fossils are found in ***sedimentary rock*** such as shale, limestone, and sandstone.

Mary Anning - Victorian Palaeontologist:

Mary Anning was a famous ***fossil hunter*** and collector. She found and identified ***many pre-historic fossils*** from the time of the dinosaurs and sold them to make money for her family.

Anning was one of the ***earliest fossil hunters*** to identify these pre-historic fossils, and she shared her specimens and ***impressive knowledge*** about them with scientists at the time.

Anning was born and grew up in ***Lyme Regis***, on the south coast of ***Dorset***. Known as the ***'Jurassic Coast'***, this is an area with ***lots of fossils***.

Although recognised by the science community, Anning was ***not admitted*** to The ***Geological Society*** – ***women were not allowed to join*** it until ***1904***. However, The Geological Society ***did record her death in 1847***, demonstrating her importance.

When she was ***12***, Anning's brother spotted the fossilised skull of an ***Ichthyosaur***. Anning ***uncovered it*** and ***discovered*** what turned out to be the ***first complete Ichthyosaur fossil*** to be found. In ***1823***, Anning discovered a ***Plesiosaurus*** and in ***1828*** she discovered a ***Pterodactylus***.

Many ***scientists*** came to ***visit Anning*** because she was so ***knowledgeable*** about her finds and the many other ***pre-historic fossils.***