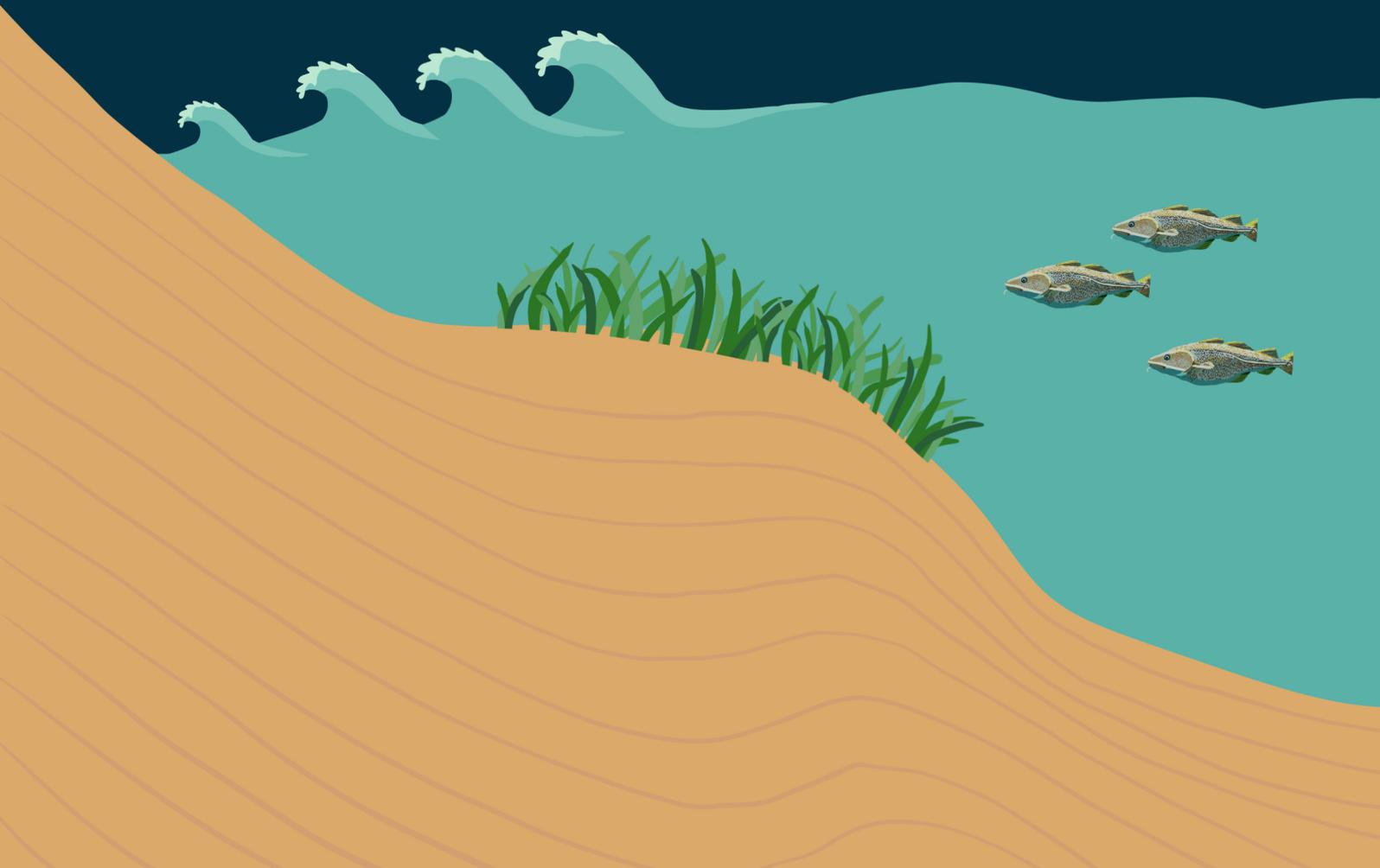




# INTRODUCTION TO GEOLOGY ACTIVITY GUIDE AGES 11-14



# OVERVIEW

This activity guide introduces the topic of geology. Within this guide are two activities which show the basics of geology and explain how the shape and structure of the coastline benefits the growth of seagrass.

- **Lesson Objective:** to gain an understanding of the basics of geology and its application to our broader understanding of the Earth
- **Curriculum links:** Geography/Science/Creative Arts

## LEARNING TIPS

The activities in this 'introduction to geology guide' can be combined with '**Restoration**' and '**Plant biology**' activities by considering whether the geology of the area lends itself to be a good habitat for seagrass.

Check out the recommended YouTube videos below or host a movie night to watch Ice Age or Journey to the Center of the Earth.

- A Brief History of Geological Time <https://www.youtube.com/watch?v=rWp5ZpJAIAE>
- The Whole Saga of the Supercontinent <https://www.youtube.com/watch?v=KfYn9KVya-Q>
- What if Pangea Never Broke Apart? [https://youtu.be/7leF\\_6u4ohl](https://youtu.be/7leF_6u4ohl)
- The Geologists Are Coming <https://www.youtube.com/watch?v=1NU51Jldrg>
- Plate Tectonics Theory Lesson [https://www.youtube.com/watch?v=zbtAXW-2nz0&list=PLHMOiIVKE\\_NxoKclVJKwiOCmYq7WZMdiD&index=3](https://www.youtube.com/watch?v=zbtAXW-2nz0&list=PLHMOiIVKE_NxoKclVJKwiOCmYq7WZMdiD&index=3)

## KEY INFORMATION

- Indoor and outdoor activities
- Individual and group activities
- Time - 60 minutes
- Practical and workbook

## KEY WORDS

### Compaction –

A process where sediment becomes squashed closer together during burial

### Core –

Found at the center of the Earth. Separated into the 'inner' and 'outer' cores which are made from nickel and iron

### Crust –

The thin and rocky outermost layer of Earth (approx. 20 km thick)

### Deposition –

The process of sediment settling from the water or wind as the flow slows down, or from ice as it melts

### Erosion –

Breakdown and removal of rock material by flowing water, wind, or moving ice. Not to be confused with weathering!

### Fossil –

Any trace of past life preserved in a rock (includes animal tracks & burrows as well as shells, skeletons and impressions of soft flesh)

# INTRODUCTION

## “Do you know what rocks? *Geology.*”

From studying rocks, we have learnt so much about the history of the earth. We've learnt what the weather was like thousands of years ago and discovered animals that haven't changed in millions of years. Rocks have taught us about super volcanos which might destroy entire continents, how earthquakes happen and why sometimes the magnetic north and south poles reverse (the next one is predicted in 1000- 2000 years).

Geologists are like detectives, looking at what's around us to figure out what has come before and what lies ahead.

### **Geology –**

The area of science concerned with the solid Earth, the rocks of which it is composed, and the processes by which they change over time

### **Ice age –**

A period in Earth's history where the ice sheets cover large areas of land, due to an overall lowering of the Earth's global temperatures

### **Igneous –**

A type of rock formed from magma, either erupted from a volcano or cooled below ground in an intrusion

### **Lithosphere –**

Outer layer of Earth (uppermost mantle and crust) that behaves as a number of rigid, moving "plates"

### **Mantle –**

Layer of hot, dense rock deep beneath the surface (from about 25 to 2500 km down). Hot enough to flow slowly

### **Metamorphic –**

A rock which has re-crystallised due to heat and/or pressure. Examples: marble, slate, schist

### **Minerals –**

Naturally occurring chemical compound (e.g. calcium carbonate), often with a regular crystal structure

### **Sedimentary –**

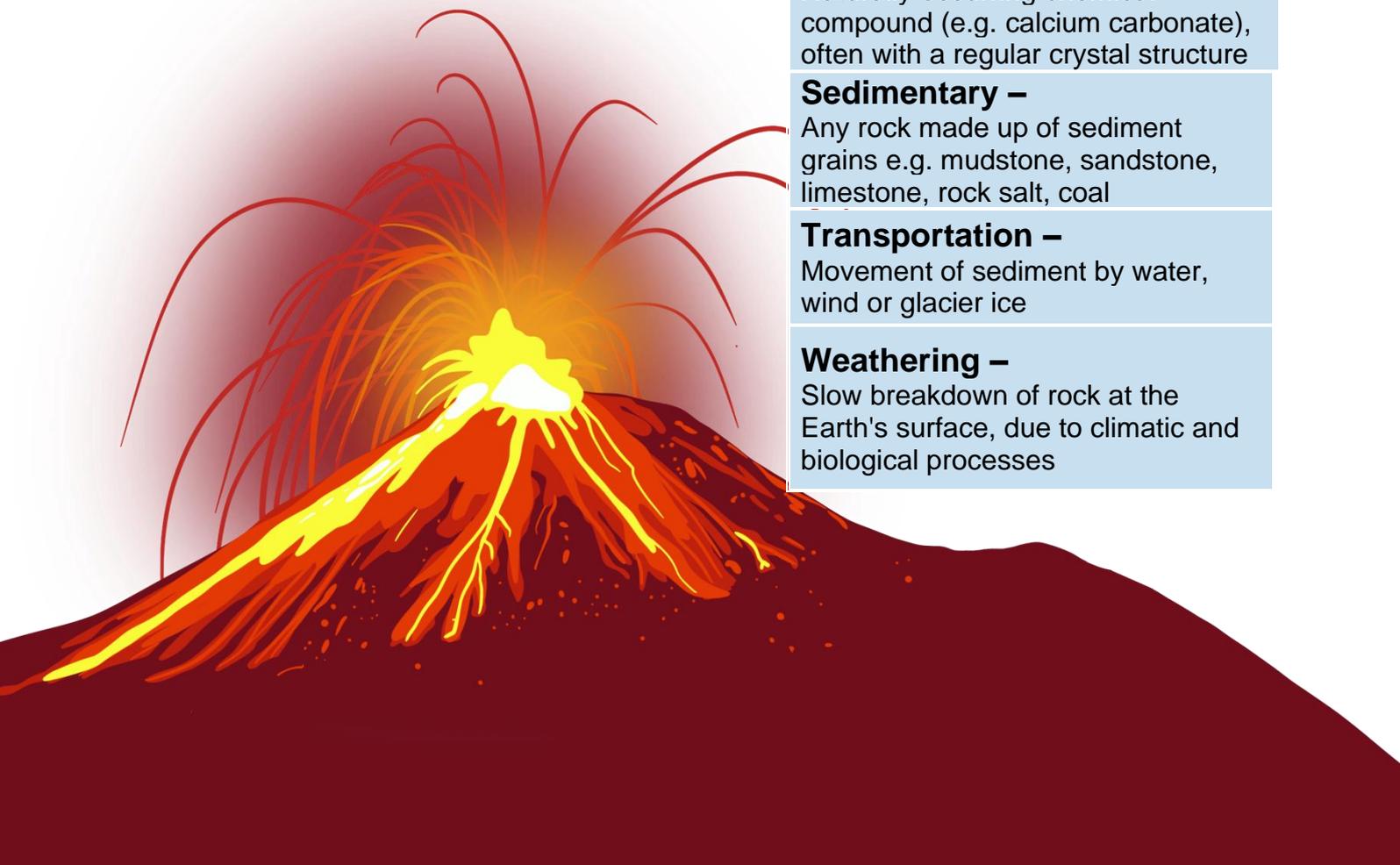
Any rock made up of sediment grains e.g. mudstone, sandstone, limestone, rock salt, coal

### **Transportation –**

Movement of sediment by water, wind or glacier ice

### **Weathering –**

Slow breakdown of rock at the Earth's surface, due to climatic and biological processes



# ACTIVITY 1:

1) Simply run through the Geology PowerPoint carrying out the classroom and independent activities as you go.

2) This activity will introduce students to the basics of geology and its application to our broader understanding of the Earth. Following an overview of key words and theories, students will have an opportunity to explore geographical features of the UK, including any features of special interest.

3) To summarise what they have learnt, students will complete a pop quiz in teams with a chance to win a prize.



## YOU WILL NEED:

Introduction to Geology PowerPoint



Pencils



Lined Paper/Workbooks



Rulers



Quiz sheets and Quiz prize



Keyword sheets



Scissors and glue



## ACTIVITY 2:

For activity 2, the **Rock ID & Field Sketch Tasks**, students will have an opportunity to visit a beach (sea, river, or adapt to a local field or park!), explore the environment around them and taught to successfully identify rock types and processes. They should be given the opportunity to hypothesise why sandy seabed is well adapted for seagrass to growth and what they think the landscape will look like in the future. Finally, to summarise what they have learnt, students can create a field sketch and annotate it to highlight geographical features and explain how the shape and structure of the coastline benefits the growth of seagrass.

## YOU WILL NEED:

OS Map



Pencils + paper



Clipboards



Rulers



Compasses



Hard hats



High visibility vests



Dilute hydrochloric acid



### HEALTH AND SAFETY

Geological field work carries some risk, but it can be reduced by knowledge, experience and a careful approach! Look to the beach work section of our coastal tips



## TASK – Rock identification:

- 1) Get students to identify 5 rocks found on the beach, using the **rock ID guide** provided. Only get them to identify to sedimentary/igneous/metamorphic level. If you feel confident with their ID skills, challenge them to narrow it down further! Get them to run over how each rock type is formed, have them look around their environment to see if they can recognise any features that might suggest the rock type for the area (which they should remember from the BGS map in the PowerPoint!) e.g., **stratification**.
- 2) Get students to suggest possible processes that explain the rock's shape and present location (Keywords: **Deposition, Transportation, Erosion** and **Weathering**).

## TASK – Field sketch:

- 1) Students need to sketch their surroundings following the PowerPoint field sketch guide. Get them to annotate and highlight key features and delegate one student to take photographs of the area.
- 2) Get them thinking about how these features may have formed, for example are there any headlands, caves or bays?
- 3) If relevant, get students to identify coastal features that might benefit the marine life, for example seagrass meadows need sheltered bay with sandy or muddy sediment.



## Guide to a field sketch:

Field sketches are an important tool in the world of fieldwork. They are a form of **qualitative data** and can be used alongside photographs to summarise important geological features. Artistic skills are not required!



- 1) Identify the landscape that needs to be sketched. Give your sketch a title.
- 2) Draw an outline of the main features of the landscape e.g., mountains, valleys or roads!
- 3) Add detail to the sketch to record more information e.g., recognisable trees, meanders in a river or caves at the beach.
- 4) If it's useful (for scale!) draw people, this can be a helpful trick when trying to estimate heights of features!
- 5) Annotate or label the sketch, note down the weather, time and date.
- 6) Take a photograph to support your sketch.



### FUN FACT!

Geology tells us the history of earth; from the weather to what dinosaurs liked for breakfast!

# WORK SHEET FOLLOW UP:

1) Draw James Hutton:



2) Give your own definition for:

a. Geology

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b. Uniformitarianism

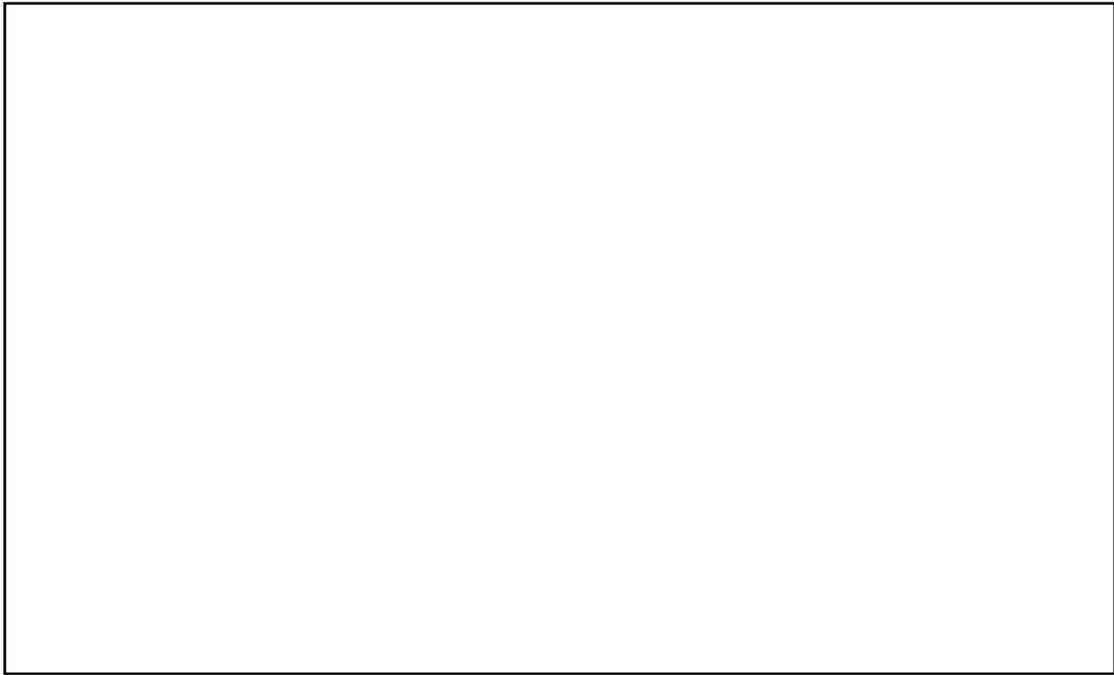
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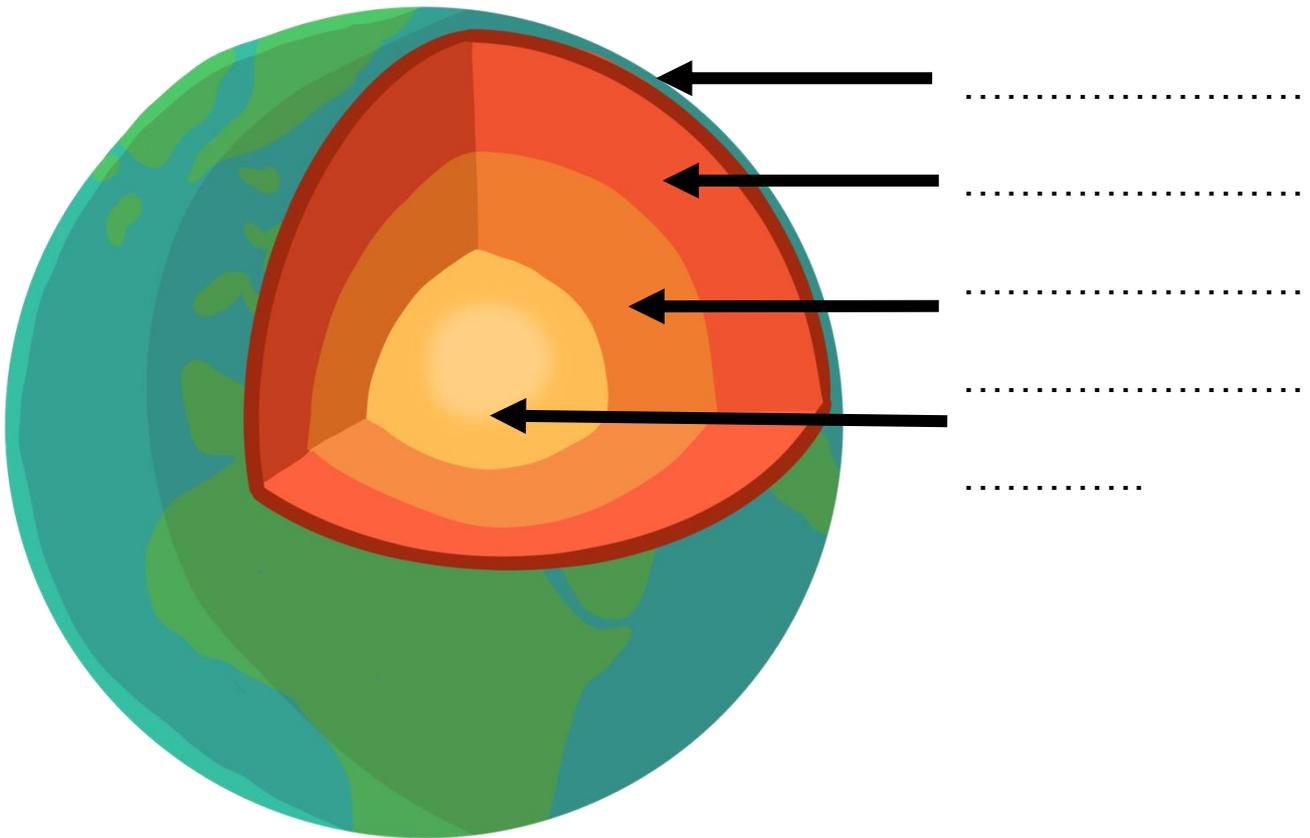
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3) Draw the geological timeline:



4) Label the earth's inner core, outer core, mantle and crust!



5) Mix and match of keywords:

<b>Compaction</b>	<b>Core</b>
<b>Crust</b>	<b>Deposition</b>
<b>Erosion</b>	<b>Fossil</b>
<b>Geology</b>	<b>Ice Age</b>
<b>Igneous</b>	<b>Lithosphere</b>
<b>Mantle</b>	<b>Metamorphic</b>
<b>Minerals</b>	<b>Sedimentary</b>
<b>Transportation</b>	<b>Weathering</b>
A process where sediment becomes squashed closer together during burial	Found at the center of the Earth. Separated into the 'inner' and 'outer' cores which are made from nickel and iron.
The thin and rocky outermost layer of Earth (approx. 20 km thick)	The process of sediment settling from the water or wind as the flow slows down, or ice as it melts
Breakdown and removal of rock material by flowing water, wind, or moving ice. Not to be confused with weathering!	Any trace of past life preserved in a rock (includes animal tracks & burrows as well as shells, skeletons and impressions of soft flesh)
The area of science concerned with the solid Earth, the rocks of which it is composed, and the processes by which they change over time.	A period in Earth's history where the ice sheets cover large areas of land, due to an overall lowering of the Earth's global temperatures.
Formed from magma, either erupted from a volcano or cooled below ground in an intrusion	Outer layer of Earth (uppermost mantle and crust) that behaves as a number of rigid, moving "plates"
Layer of hot, dense rock deep beneath the surface (from about 25 to 2500 km down). Hot enough to flow slowly	A rock which has re-crystallised due to heat and/or pressure. Examples: marble, slate, schist
Naturally-occurring chemical compound (e.g. calcium carbonate), often with a regular crystal structure.	Any rock made up of sediment grains e.g., mudstone, sandstone, limestone, rock salt, coal
Movement of sediment by water, wind or glacier ice	Slow breakdown of rock at the Earth's surface, due to climatic and biological processes

- 6) Find and ID 5 different rocks, aim for one of each sedimentary, igneous and metamorphic.
- 7) Draw the rocks you found in q6 and label the parts that made you think it was that type of rock.



- a. Suggest what processes might have shaped at least 3 of these rocks. Use the keywords!

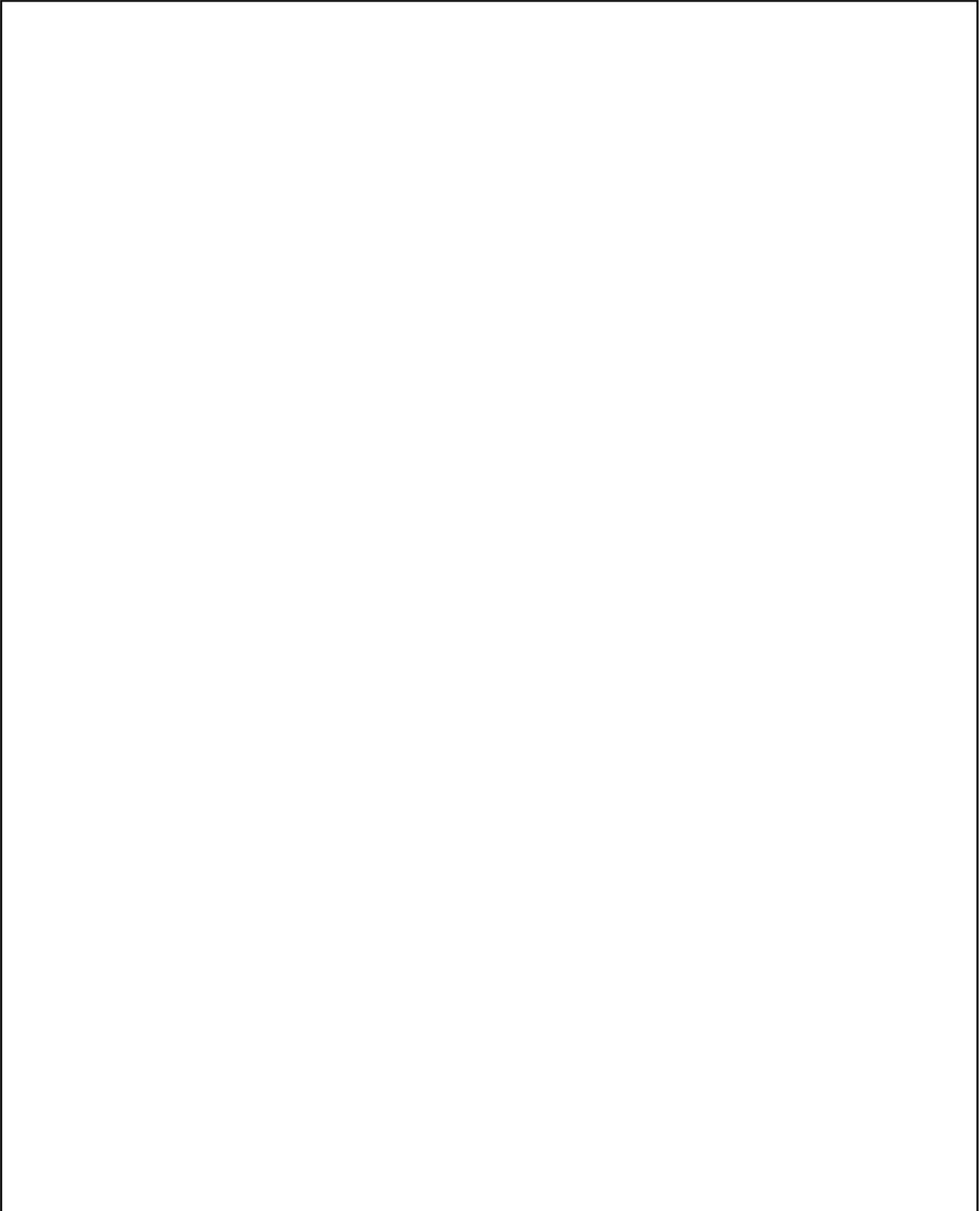
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- b. From your rock ID guide, add where on the Mohs hardness scale you think your rocks are.

**8)** Draw a field sketch!



**9)** Write your own 'Rock Cycle 'song

**10)** Create a poster showing the geology and features of the area

# WORK SHEET ANSWERS:

1) N/A

2) a. Geology - *area of science concerned with the structure of the Earth. It includes the study of rocks and the processes that shape our planet.*

b. Uniformitarianism - *the assumption that the natural processes and laws we see today have always operated the same.*

3) Draw the geological timeline: Precambrian (Hadean, Archean, Proterozoic); Paleozoic (Cambrian, Ordovician, Silurian, Devonian, Carboniferous, Permian); Mesozoic (Triassic, Jurassic, Cretaceous); Cenozoic (Tertiary, Quaternary)

4)

