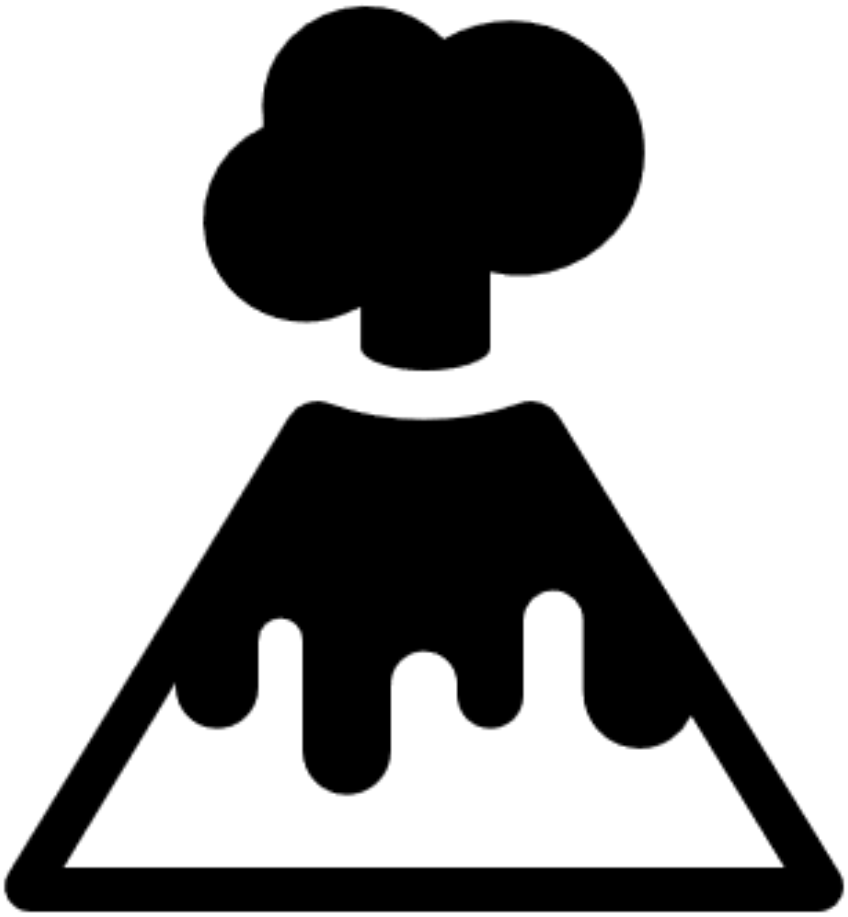
Earth’s resources



Name _____

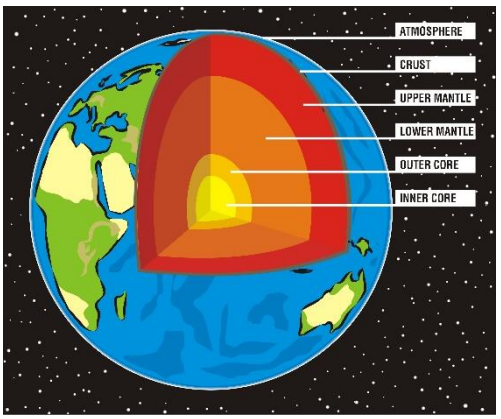
Class _____

Teacher _____

L1 The structure of the earth

What is Earth Made Of?

Imagine slicing a gigantic cake made of layers. Well, Earth is a bit like that, with different layers beneath our feet. Let's dive right into the Earth's structure!



- The Crust: The Earth's outermost layer, like the cake's thin outer covering, is called the crust. It's where we live and where all the land and oceans are. The crust is made up of solid rocks and soil.
- The Mantle: Going deeper, we reach the mantle, which is like a thick layer of gooey molasses in our cake analogy. The mantle is hotter and can flow very slowly. This flowing mantle creates movements in the Earth's crust that we feel as earthquakes and see as volcanic eruptions.
- The Outer Core: This layer is made of liquid iron and nickel. Imagine it as the gooey, liquid chocolatey centre of our cake. The outer core's movement generates Earth's magnetic field, which is like a protective shield around our planet.
- The Inner Core: The innermost layer is solid and very hot, like the core of a hot cake. The intense pressure and heat turn iron and nickel into a solid state even though they are naturally liquid. The inner core's heat is the reason we have volcanoes, earthquakes, and even mountains!

How Do We Know About Earth's Structure?

Scientists use various methods to learn about the Earth's structure. Here are some ways:

Seismology: By studying how seismic waves (waves from earthquakes) travel through the Earth, scientists can map its layers. Different materials affect these waves differently.

Drilling: We've drilled deep into the Earth's crust to collect samples and gather data.

Earth's Magnetic Field: We use instruments to study the Earth's magnetic field to understand the outer core.

Why is Earth's Structure Important?

Understanding the Earth's structure helps us predict earthquakes, locate valuable resources like minerals and oil, and even learn about the history of our planet.

Earthquakes: Knowing where the Earth's plates meet helps us prepare for and respond to earthquakes.

Volcanoes: Understanding the mantle and outer core helps us predict volcanic eruptions.

Resources: Knowledge of the Earth's layers helps us find and extract valuable minerals and energy resources.

History: We can learn about Earth's history, including how it formed and how life evolved, by studying its structure.

Habitability: Earth's unique structure, with a solid surface and a magnetic field, makes it a perfect place for life. Understanding this helps us search for life on other planets.

Let's Sum It Up!

Earth has four main layers: the crust, mantle, outer core, and inner core.

Each layer has unique properties, like temperature, composition, and behaviour.

Scientists study Earth's structure using methods like seismology, drilling, and studying the magnetic field.

Understanding the Earth's structure is crucial for predicting natural disasters, finding resources, and learning about our planet's history.

Independent practice

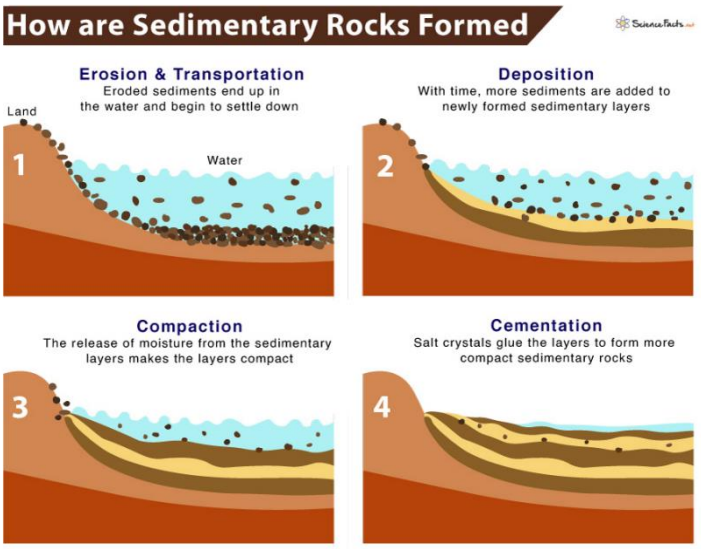
1. What are the four main layers of the Earth?
2. Which layer is like the Earth's outer covering, where we live?
3. Which layer is made of gooey molasses-like material that flows slowly?
4. What causes earthquakes and volcanic eruptions?
5. **Extended writing (paragraph needed**): Describe the structure of the earth and its composition.
6. What is the outer core made of, and what does it generate?
7. Why is the inner core solid even though it's incredibly hot?
8. How do scientists study the Earth's structure using seismic waves?
9. What is one practical application of understanding the Earth's structure?
10. How does Earth's structure help us predict earthquakes?
11. **Extended writing (paragraph needed):** What can we learn about Earth by studying its layers?
12. How does Earth's structure affect its habitability for life?
13. Why is Earth's magnetic field important?
14. What is the mantle's role in shaping the Earth's surface?
15. Can we use drilling to study the Earth's layers, and if so, how?

L2 Sedimentary rocks

What are Sedimentary Rocks?

Sedimentary rocks are one of the three main types of rocks found on Earth, the other two being igneous and metamorphic rocks. Unlike igneous rocks formed from molten magma or metamorphic rocks changed by heat and pressure, sedimentary rocks are made from tiny pieces of other rocks, minerals, and even dead plants and animals.

How Are Sedimentary Rocks Formed?



- Weathering: It all starts with weathering, where rocks on the Earth's surface break into smaller pieces due to wind, water, and other natural forces.
- Erosion: These tiny rock fragments are then carried away by rivers, streams, wind, or ice.
- Deposition: Eventually, these fragments settle down in new locations, like riverbeds, lakes, or the ocean floor.
- Compaction: As more and more sediment piles up, it gets squished together under the weight of the layers above, like a giant sandwich.
- Cementation: Over time, minerals in the water seep into the spaces between the sediment particles and act like glue, holding them together.

Why Are Sedimentary Rocks Important?

Sedimentary rocks are like time capsules that capture the history of our planet. They tell us about past environments, ancient life forms, and even major events like earthquakes and volcanic eruptions. By studying these rocks, scientists can piece together Earth's incredible journey over millions of years.

Common Types of Sedimentary Rocks:

- Sandstone: Made of tiny grains of sand, often found in deserts.
- Limestone: Forms from the shells of ancient sea creatures.
- Shale: Composed of fine particles, it can split into thin layers.
- Conglomerate: Contains rounded pebbles and is often found in riverbeds.
- Coal: Made from the remains of plants that lived millions of years ago.

Fun Facts about Sedimentary Rocks:

- The Grand Canyon in the United States is a perfect example of sedimentary rocks exposed over millions of years by the Colorado River.
- Fossils, the remains of ancient plants and animals, are often found in sedimentary rocks, helping us understand life from the past.
- Some sedimentary rocks, like sandstone, can be used to make buildings and sculptures.

Independent practice

1. What are sedimentary rocks, and how do they differ from igneous and metamorphic rocks?
2. How do sedimentary rocks form? Describe the processes involved.
3. Why are sedimentary rocks important for scientists studying Earth's history?
4. **Extended writing (paragraph required):** Describe how sedimentary rocks are formed
5. Can you name at least three common types of sedimentary rocks?
6. Where can you find sandstone, and what is it made of?
7. What is limestone primarily composed of, and how is it formed?
8. What is shale known for, and why does it split into thin layers?
9. Describe the formation of conglomerate rocks and where they are often found.
10. What unusual origin do coal sedimentary rocks have?
11. How do sedimentary rocks contribute to our understanding of past life forms?
12. **Extended writing (Paragraph required):** Explain why sedimentary rocks are important to humans.
13. Can you explain how the Grand Canyon is related to sedimentary rocks?
14. Why are fossils frequently found in sedimentary rocks?
15. Give an example of a practical use of sedimentary rocks in our daily lives.
16. What's the significance of sedimentary rocks in uncovering Earth's history?

L3 Igneous Rocks

What Are Igneous Rocks?

Igneous rocks are one of the three main types of rocks found on Earth. The word "igneous" comes from the Latin word "ignis," which means "fire." That's a clue to their origin!

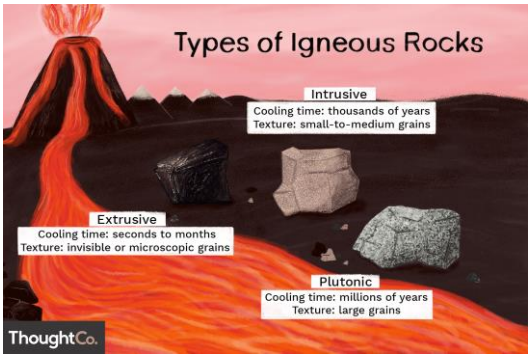
Where Do They Come From?

Igneous rocks are born from molten rock material called magma. Magma can be found deep beneath the Earth's surface. When magma rises to the surface and cools down, it solidifies and turns into igneous rocks. Imagine it like a lava lamp in slow motion!

Types of Igneous Rocks:

Intrusive Igneous Rocks: These form beneath the Earth's surface and cool down slowly. They have large crystals because they had time to grow. Examples include granite and diorite.

Extrusive Igneous Rocks: These rocks form when lava erupts from volcanoes and cools down quickly on the surface. They have small crystals or sometimes even look glassy. Obsidian and pumice are good examples.



Colours and Textures:

Igneous rocks come in a variety of colours and textures. They can be black, grey, red, pink, or even green! The texture depends on how fast they cooled. Some are smooth, like glass, while others are rough and bumpy.

What Can You Learn from Igneous Rocks?

Igneous rocks are like Earth's time capsules. Scientists study them to learn about Earth's history. By analysing the minerals and crystals inside, they can figure out the conditions under which the rocks formed and even the temperature of the magma.

Uses of Igneous Rocks:

Igneous rocks have many practical uses. Granite, for example, is commonly used for kitchen countertops because it's durable and looks great. Pumice is used in skin exfoliants, and obsidian was once used to make sharp tools and arrowheads by ancient people.

Independent practice

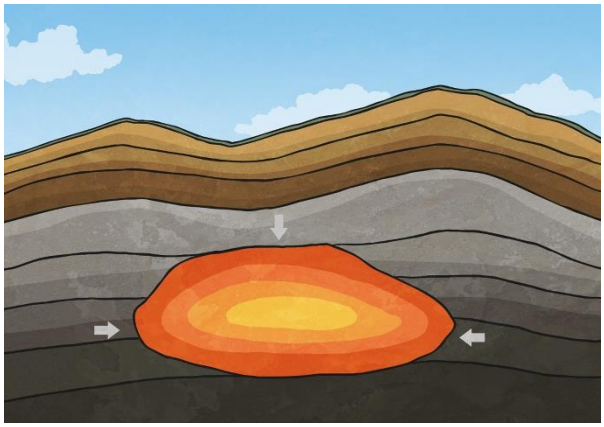
1. What is the meaning of the word "igneous," and why is it related to these rocks?
2. Where does magma come from, and how does it turn into igneous rocks?
3. **Extended writing (paragraph needed):** Compare the two forms of igneous rock.
4. Why do intrusive igneous rocks have larger crystals than extrusive ones?
5. Describe the different colours and textures of igneous rocks.
6. How do scientists use igneous rocks to learn about Earth's history?
7. Why is granite a popular choice for kitchen countertops?
8. Can you name a practical use for pumice?
9. What is obsidian, and how was it used in the past?
10. **Extended writing (paragraph required):** Explain how the temperature of magma can be determined by studying igneous rocks.
11. What is the difference between lava and magma?
12. Can you think of any famous natural landmarks or formations that are made of igneous rocks?
13. How might the cooling rate of magma affect the texture of an igneous rock?
14. If you were to go on a geological expedition, what type of igneous rock would you be most excited to find and why?

L4 Metamorphic rocks

Metamorphic rocks are one of the three main types of rocks, alongside igneous and sedimentary rocks. But what makes metamorphic rocks special is their unique transformation process. They start as either sedimentary or igneous rocks and change under immense heat and pressure beneath the Earth's crust. Think of it as a rock's way of reinventing itself!

Formation Process:

Metamorphic rocks form deep within the Earth's crust. When other rocks (either sedimentary or igneous) get buried deep underground, they experience high temperatures and pressure. These conditions cause minerals within the rocks to rearrange, creating new structures and textures. Imagine squishing and baking clay to make different shapes – that's somewhat like what happens to rocks during metamorphism.



Types of Metamorphism:

There are two main types of metamorphism:

Contact Metamorphism: This occurs when rocks meet hot molten rock (magma) or hot fluids, like hot water from underground. The heat from these sources causes nearby rocks to change.

Regional Metamorphism: This type of metamorphism happens over large areas due to tectonic forces and tremendous pressure deep within the Earth's crust. It's like a slow and steady transformation process that takes millions of years.

Examples of Metamorphic Rocks:

Marble: Marble is a beautiful metamorphic rock that forms from limestone. It's used in sculptures and buildings because of its smooth texture and unique colours.

Slate: Slate is a metamorphic rock that originates from shale. It's often used for roofing and as chalkboards because it's easy to carve and write on.

Schist: Schist is a shiny and layered metamorphic rock that starts as shale or mudstone. It's known for its sparkling minerals and can be used as decorative stone.

Why Study Metamorphic Rocks?

Understanding metamorphic rocks is crucial for several reasons:

- They provide clues about Earth's history and the immense forces acting beneath its surface.
- We can learn about the conditions deep within the Earth's crust, which helps us in resource exploration.
- Metamorphic rocks are used in construction and art, making them economically important.
- They're an integral part of the rock cycle, which shapes our planet's landscape.

Metamorphic rocks are like nature's transformation artists, showcasing the incredible changes that can occur deep within the Earth's crust. By studying them, we unlock secrets about our planet's history, resources, and geologic processes. So, keep exploring, and who knows, maybe one day you'll discover a new type of metamorphic rock that will rewrite the Earth's story!

Independent practice

1. What are metamorphic rocks, and how are they different from other types of rocks?
2. How do metamorphic rocks form, and what is the role of heat and pressure in their formation?
3. **Extended writing (paragraph needed):** Compare the two types of metamorphism.
4. Give an example of a metamorphic rock formed from limestone.
5. What is the name of the metamorphic rock that originates from shale and is used for roofing?
6. Describe the process of contact metamorphism and provide an example.
7. Why are metamorphic rocks important for understanding Earth's history?
8. What kind of metamorphism occurs due to tectonic forces over large areas?
9. Explain why some metamorphic rocks are used in construction and art.
10. How are metamorphic rocks connected to the rock cycle?
11. **Extended writing (paragraph needed):**What is the difference between slate and schist in terms of their origin and uses?
12. Can you think of an everyday item made from marble?
13. What is the primary factor responsible for transforming rocks into metamorphic rocks?
14. Imagine you're an explorer deep inside the Earth's crust. Describe the conditions you might encounter during regional metamorphism.

L5 The rock cycle

Imagine a time when Earth was just a molten ball, and now, over billions of years, it has transformed into the beautiful planet we know today. Rocks have played a crucial role in this transformation, and the rock cycle helps us understand how rocks change and evolve over time.

Recap: What Are Rocks?

First, let's start with the basics. Rocks are hard, solid substances made up of minerals. You can think of them as Earth's building blocks. They come in all shapes, sizes, and colours, and you can find them everywhere – from mountains to riverbeds to your very own backyard.

The Three Types of Rocks

Sedimentary Rocks: These rocks are like nature's history books. They are formed from tiny pieces of other rocks, dead plants, and even shells that settle and get compacted over time. Think about layers of sand or mud piling up at the bottom of a lake, and after a long time, they become solid rock.

Igneous Rocks: These rocks are born from fire! They form when molten rock, called magma, cools and hardens. Magma can erupt from volcanoes or even cool slowly below the Earth's surface. Have you heard of granite? It's an example of an igneous rock.

Metamorphic Rocks: These rocks are like the shapeshifters of the rock world. They start as either sedimentary or igneous rocks but change under immense heat and pressure deep within the Earth. This transformation makes them look completely different from their original form.

The Rock Cycle

Now, imagine a never-ending journey where rocks change from one type to another. This incredible process is called the rock cycle. Let's break it down into steps:

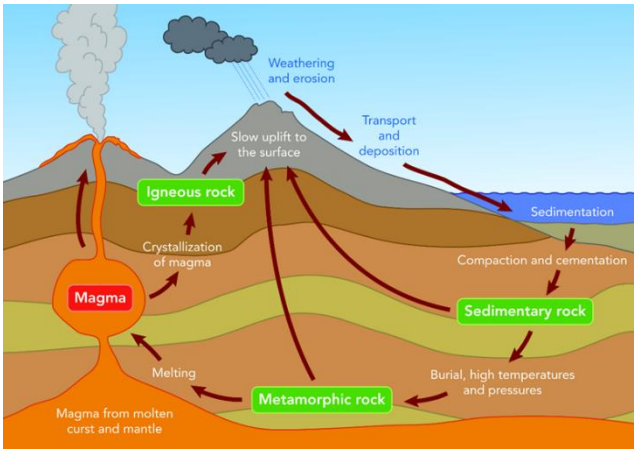
Formation: It all begins with magma or lava cooling and hardening to form igneous rocks.

Weathering: Wind, rain, and even plant roots break down these rocks into tiny pieces.

Erosion: Rivers and glaciers carry these tiny rock pieces to new places.

Deposition: When the moving water slows down, it drops the rock pieces, creating layers.

Compaction: The layers get squished together under the weight of more layers, turning them into sedimentary rocks.



Heat and Pressure: If these sedimentary rocks get buried deep within the Earth, they may undergo metamorphism, transforming into metamorphic rocks.

Melting: If metamorphic rocks are subjected to extreme heat, they can melt and become magma again.

The Cycle Continues: The melted magma can then cool and harden, starting the cycle anew.

The Rock Cycle in Action

Think about a volcanic eruption. It begins with magma (igneous rock) spewing out of the Earth's crust. Over time, this lava cools and solidifies to form new rocks. These rocks can then break down into smaller pieces, get carried

away by rivers, settle in new layers, and eventually become sedimentary rocks. If these sedimentary rocks are buried deep and exposed to heat and pressure, they can change into metamorphic rocks.

Independent practice

1. What are rocks made of?
2. Name the three types of rocks.
3. How do sedimentary rocks form?
4. Explain how igneous rocks are created.
5. **Extended writing (paragraph needed):** Describe the rock cycle.
6. What causes metamorphic rocks to change?
7. Give an example of a sedimentary rock.
8. Can you name an igneous rock?
9. What's special about metamorphic rocks?
10. What happens during weathering?
11. How do rocks move during erosion?
12. **Extended writing (paragraph needed):** Explain what deposition means in the context of the rock cycle.
13. What causes rocks to compact and become solid?
14. Can you think of a real-life example where you've seen the rock cycle in action?