 Province of the

EASTERN CAPE

EDUCATION

**DIRECTORATE SENIOR CURRICULUM MANAGEMENT (SEN-FET)**

**HOME SCHOOLING SELF-STUDY WORKSHEET**

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| **SUBJECT** | **GEOGRAPHY** | **GRADE** | **10** | **DATE** | **6/07/20** |
| **TOPIC** | **GEOMORPHOLOGY** | **TERM 2****REVISION** | **√√** | **TERM 2 CONTENT** | **√√** |
| **TIME ALLOCATION** | **1 HOUR PER DAY** | **TIPS TO KEEP HEALTHY****1. WASH YOUR HANDS thoroughly with soap and water for at least 20 seconds. Alternatively, use hand sanitizer with an alcohol content of at least 60%.****2. PRACTICE SOCIAL DISTANCING – keep a distance of 1m away from other people.****3. PRACTISE GOOD RESPIRATORY HYGIENE: cough or sneeze into your elbow or tissue and dispose of the tissue immediately after use.****4. TRY NOT TO TOUCH YOUR FACE. The virus can be transferred from your hands to your nose, mouth and eyes. It can then enter your body and make you sick.** **5. STAY AT HOME.**  |
| **INSTRUCTIONS** |  |

**GEOMORPHOLOGY GRADE 10 TERM 2**

**Geomorphology-**refers to the study of changing surface of the earth by both internal as well as external forces and their resultant landforms.

**INTERNAL FORCES**-endogenic forces e.g. earthquake, volcanism

**EXTERNAL FORCES**-exogenic forces e.g. erosion, weathering, deposition.

**THE STRUCTURE OF THE EARTH**



The earth consists of three layers i.e.

1. Crust
2. Mantle
3. Core

**CRUST**

This is the outer most layer of the earth. The crust ranges in thickness between 5km to 75 km. It is made up of the solid continent (SIMA).and the ocean floor, sea beds (SIMA). The crust makes up only about 1% of the total volume of the earth. The temperature of the crust ranges from -60⁰C to about 200⁰C where it merges with the mantle. The diving zone of distinction between the crust and the mantle is known as the **Moho Discontinuity Line.** The crust is less dense than both the mantle and the core as a result it appears to float on the denser mantle.

**Continental Crust (SIAL)**

The main rock is granite with dominant minerals **Silicon** and **Aluminium (SIAL)**. This is about 30 to 60 km thick. The sial is lighter and is therefore forms the upper layer.

**Oceanic Crust (SIMA)**

The main rock is basalt and main minerals are **Silicon** and **Magnesium (SIMA).** SIMA is between 5 to 15 km thick. Sima is heavier and forms the lower layer. It is a continuous layer around the earth and underlines the oceans.



**MANTLE**

Mantle is found below the crust. Material that makes up the mantle is plastic in nature and is called **Periolite.** This liquid rock is known as the molten magma. It is not rigid and gives way under pressure. The high temperatures of the mantle ranges between 200⁰C and 3000⁰C. This results in the viscous (fluid) nature of magma. Such temperatures affect the fluid magma as it generates convection current and thereby supports the theory of **Plate Tectonics.** This layer is about 1950 km thick and composes about 85% of the earths volume. The molten rock consists mainly of magnesium and silicon.

**CORE**

The Core is in the centre of the earth with a radius of about 3475kmof it is divided into two layers viz: **Outer Core** and **Inner Core**

**OUTER CORE**

Outer Core is in a molten state, liquid in nature. Outer core consists of minerals containing gold, platinum. These minerals became displaced to the crustal regions during the earth’s formation.

**INNER CORE**

The inner core is in a solid state. Inner core consists of nickel (NI) and Iron (FE). It has a radius of about 1350km.

**THE LITHOSPHERE AND ASTHENOSPHERE**

**Lithosphere –** is the rigid outer layer of the earth which consists of the crust and the upper part of the mantle. The Lithosphere floats over the **Asthenosphere.** Asthenosphere is the semi-fluid layer of the earth. Lithosphere is divided into two parts viz:

**Continental Lithosphere and Oceanic lithosphere**

Continental lithosphere is thicker than the oceanic lithosphere.

 

**ROCKS**

Rock is a solid made up of different minerals. Rocks are classified according to the way in which they are formed.

**They are:**

**Igneous**

 **Sedimentary**

**Metamorphic**

**IGNEOUS ROCKS**

**Formation-** the tern igneous comes from the French word **Ignis** meaning fire. These rocks form where a red-hot liquid (hot mud) cools and solidifies (becomes a solid). The molten material is called **Magma** which is below the ground and **Lava** when molten material is above the ground. Their formation therefore is associated with volcanic activity. Classified as primary rocks as all other rock types are formed from **Igneous.** Igneous rocks are classified into:

1. **Extrusive igneous rock**

2. **Intrusive igneous rock**

|  |  |  |  |
| --- | --- | --- | --- |
| **Kinds of igneous rocks** | **Where formed** | **Composition** | **Occurrence in South Africa** |
| Extrusive Igneous rocks e.g. Basalt | On the earth’s surface from volcanic eruptions and fissure eruptions | Small, fine crystals, usually dark. | High peak of the Ukhahlamba Drakensberg |
| Intrusive Igneous rock e.g. Granite, Dolerite | Inside the earth’s crust, some igneous intrusions occur deep in the earth crust. | Large crystals that can be very seoy often lighter in colour | Usually. Erosion, diggings, mountains |

**CHARACTERISTICS OF IGNEOUS ROCKS**

**Igneous rocks -**consists of crystals of various sizes (ranging from large in intrusions to microscopic sizes in extrusive rocks). The silicon gives the shiny appearance. They have no fossils (animal or plant remains) in their composition. Igneous rocks are hard and resistant to erosion; therefore, they weather or break down slowly.

**Uses of Igneous Rocks**

Igneous rocks are used in the building industry to cover walls and makes kitchen tops e.g. **Granite** as it is smooth and shiny. Granite is also used to make tombstones. They may contain minerals such as gold and diamonds. Erosion of igneous rocks leads to the formation of very fertile soil.

**Sedimentary Rocks**

**Sedimentary rocks** are formed from the particles of sand, shells, pebbles and other fragments of material. These particles are called **sediments.** Occur on the surface by the process of deposition in low-lying areas or on the sea bed. Weathering and erosion cause the sediments (rock debris/particles on the) surface to be transported by agents such as wind and water to low areas where they are deposited. Gradually, the sediments accumulate in layers and over a long period of time hardens into rock. Sedimentary rocks are known as **secondary rocks** because they are formed from igneous (primary rocks) which have been broken down. They usually form layers on (stratified rocks). Sedimentary rocks can be formed in 3 different ways:

1. Mechanically/ Clastic
2. Chemically
3. Organically

|  |  |  |
| --- | --- | --- |
| **Formation Mechanically** | **Chemically** | **Organically** |
| Particles of rocks are transported by wind and water a d deposited. These particles compress and hardens into rock layer | Sediments are left behind when evaporation occurs from solutions of dissolved minerals. | Rocks are formed from the remains of plants and animals that have hardened. |
| **Examples** | **Examples** | **Examples** |
| Sandstone from compacted sand particles. Shale from compaction of silt and water. | Rock saltGypsumLimestone | Coal from dead plant material) Oil (from animal remains) Coral (from sea animals)  |

**CHARACTERISTICS OF SEDIMENTARY ROCKS**

Sedimentary rocks usually form in layers (they are stratified). Sedimentary rocks contain fossils. The rocks are able to be folded or bend (fold mountains are usually formed from sedimentary rocks) Sedimentary rocks are fairly soft and may break apart or crumble easily.

**USES OF SEDIMENTARY ROCKS**

Sandstone used in the building industry. Table salt is used in cooking. Limestone is used to make cement. Coal and oil are used for energy. Very fertile as they contain organic matter. Softer of all rocks, therefore erode quickly to form most fertile soil.

**HOW COAL IS FORMED**

Coal forms in swampy areas as a result of the decay of plants in the absence of oxygen. Other sediments such as sand, clay and silt are also deposited on top of decaying plants. The weight of the sediments compresses the underlying decayed organic matter turning it into rich dark soft substance called **peat.** Further compressing gradually squeezes out water & causes the peat to turn into rock called **coal**.

**METAMORPHIC ROCK**

**Formation metamorphic 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 existing rocks that became physically and chemically change when exposed to excessive temperatures and pressure from the mantle. Each type of igneous rock or sedimentary rock forms a particular kind of metamorphic rock.

**EXAMPLES OF METAMORHIC ROCKS**

|  |  |  |
| --- | --- | --- |
| Marble | Formed from | Limestone |
| Schist | Formed from | Basaltic |
| Quartzite | Formed from | Sandstone |
| Slate | Formed from | Shale |
| Gnesis | Formed from | Granite |

**CHARACTERICTICS AND USES OF METAMORPHIC ROCKS**

Metamorphic rocks are very durable and difficult to erode. These rocks are important for building construction. Used foo decorative purposes in construction e.g. marble. Used for roofs. Tiling, work surfaces.

**INTRUSIVE IGNEOUS ACTIVITY AND ASSOCIATED FEATURES**

**Batholiths-** It is the largest of all intrusive forms, covering thousands of square km. It forms from magma that cools & hardens below the earth’s surface. It is composed of granite. When the overlying rocks are removed, it is exposed on the earth’s surface.

**Lopoliths-** It is an igneous intrusion that forms when sedimentary strata sag creating a basin shaped mass.

**Laccoliths** – It is an igneous intrusion that forms when strata are forced upwards thus forming a mushroom shape.

**Sills-** It is a horizontal intrusion of igneous rock that forms a sheet.

**Dykes**- It is a vertical intrusion of igneous rock that forms a wall.



**Other landforms associated with igneous rocks**

**Granite** domes- These form from batholiths. When all rocks above the batholith have been eroded away, a granite dome forms, Paarlberg in Parl is an example of a granite dome.

**Lava flows**- This form when lava flows out from a number of vents in the Earth’s surface and coves a large area. Lava hardens into a rock e. g. basalt.

**A caldera**- This is a collapsed volcano and often contains a lake.

**Tors**- These are pile-up of rounded columns of rock made of core stones.



**LANDFORMS ASSOCIATED WITH SEDIMENTARY ROCKS**

**Landforms with horizontal strata**

Some bands of strata are stronger and more resistant to weathering and erosion. The softer layers are less resistant and are more easily eroded.

**Plateaux and plains**- a plateau is a flat-topped landform made when horizontal strata is uplifted. A plain is a flat, low-lying landform.

**Mesa**- flat-topped hill. A mesa is broader than its height. Over time a mesa erodes into a butte.

**Butte**- is a flat-topped hill with a small top. A butte is higher than its width. A butte further erodes into a conical hill.

**A Conical hill**- is a hill with a pointed top and is made from a butte which has been eroded It has a level surface with steep slopes

**Landforms associated with inclined strata**

Strata that has been tilted or inclined erode to form a landform called a cuesta.

A cuesta has one steep slope called a **scarp** and one gentle slope called a **dip**



**LANDFORMS ASSOCIATED WITH METAMORPHIC ROCKS**

Escarpment- is a steep slope along the edge of a plateau. It forms where strata have been tilted and there is a resistant layer. The Magaliesberg in Gauteng is an example of an escarpment.

**CONTINENTAL** **DRIFT THEORY**

According to WEGNER, continents were once joined together in a single landmass called **PANGEA (**all land)

With time, the continents started to drift apart. Pangea split into **LAURASIA** and **GONDWANALAND**. The continents continued to move until they looked like today’s map of the world. 

**Evidence of continental drift**

1. There are very similar fossils of animals and plants in both Africa and South America to prove that two continents were once joined together.
2. Rock types and mountain ranges showing the same age and composition can be matched across continents.
3. Ocean floor spreading- The ridges in many oceans have younger rocks than the rocks further away, suggesting that ocean floors are spreading.
4. There is evidence of ice erosion and ice deposition over much of southern continents to suggest these were close to the south pole.
5. When magma cools, certain minerals solidify in alignment with the magnetic poles but the minerals in rocks today point in different directions, suggesting the position of the rocks has changed.

**PLATE TECTONICS**

**KEY TERMS:**

**Tectonic plate**- a section of the Earth’s crust which can move on the mantle.

**Plate boundary**- the edge of a tectonic plate. Plate tectonics is a theory that suggests the crust of the Earth is divided into 7 giant pieces and 12 small ones called tectonic plates.

Most plates are made of some continental crust and some oceanic crust. The plates move a few centimetres each year (5cm). Forces within the mantle cause the plates to move.

The edges of plates are called PLATE BOUNDARIES and plate movement is more noticeable at the plate boundaries.



**TYPES OF PLATE BOUNDARIES**

**Divergent boundaries**- plates move away from each other. New crust is created from erupting volcanoes at divergent plate boundaries.

**Convergent boundaries**- plates come together. One plate is forced under another into the mantle. The plate melts causing earthquakes and volcanic eruptions.

**Transform/transverse/passive boundaries**- plates grind past each other and movement is associated with earthquakes.

**LANDFORMS ASSOCIATED WITH DIFFERENT PLATE BOUNDARIES**

**DIVERGENT PLATE BOUNDARIES**

There are two kinds of divergent plate boundaries;

1. A divergent boundary between two oceanic plates
2. A divergent boundary within continental crust

**A divergent plate boundary between two ocean plates forms a MID OCEAN RIDGE.**

TWO plates pull apart and as magma rises up and solidifies, new land is created between the plates and is called a mid ocean ridge. Volcanic eruptions and earthquakes are also associated with mid ocean ridges. The Mid Atlantic Ridge forms the longest chain of mountains in the world. Volcanoes which form with their peaks above sea-level are volcanic islands such as the Azores and Iceland.

**A divergent plate boundary involving continental crust**

When continental crust splits and separates, two continental plates will form**. A RIFT VALLEY** is formed e.g. The East African Rift Valley. Land masses continue to move apart and new crust fills the gap between the separating continental crust and eventually a new ocean will fill this space.

**LANDFORMS ASSOCIATED WITH CONVERGENT PLATE BOUNDARIES**

There are 3 kinds of converging plate boundary

1. A convergent plate boundary between two oceanic plates
2. A convergent plate boundary between an ocean plate and a continental plate.
3. A convergent plate boundary between two continental plates.

**A convergent plate boundary between two ocean plates**

Two ocean plates converge, one plate is pushed under the other creating volcanic islands. New land is created between the plates and this is also called **constructive plate boundary.**

**A convergent plate boundary between an ocean plate and a continental plate**

When an oceanic plate is pushed under a continental plate, a range of mountains may form. Oceanic trenches occur along convergent plate boundaries where an oceanic plate converges with a continental plate. The oceanic plate consists of denser rocks so it slides underneath the continental plate. This causes the seabed to form a deep trench all along the subduction zone. The zone where this happens is called the SUBDUCTION ZONE because land is ‘lost’. Subduction zone is a deep trench on the ocean floor where an oceanic plate is drawn under along a plate boundary. The plate boundary is also called a **destructive plate boundary**.

**A convergent plate boundary between two continental plates.**

When two continental plates converge, neither plate can subduct under the other because they are of similar material. The crust collides to create high mountain ranges e.g. the Himalayas were formed by the collision of the Indian plate with the Eurasian plate.

**LANDFORMS ASSOCIATED WITH TRANSFORM PLATE**

Earth’s crust is neither created nor destroyed along a transform boundary. Movement at transform boundaries causes earthquakes. e.g. the San Andreas fault in California is on a transform boundary.

**THE WORLD’S VOLCANIC AND EARTHQUAKE ZONES**

Earthquakes are found in three long. Narrow belts around the entire Pacific Ocean, along the length of the Atlantic Ocean and across the continents of Europe and Asia.

Volcanoes are found in long narrow belts around the entire Pacific Ocean called **PACIFIC RING OF** **FIRE.**

**INTERNAL FORCES THAT OPREATE IN THE CRUST**

**FOLDING AND FAULTING**

Rocks change shape when they are compressed from the sides. A fold is a bend in a rock that is caused by compressional forces. A fault is a break within the crust. Faulting can be caused by forces of compression or tension.

**STRUCTURE OF A FOLD.**

The peak of a fold is called an anticline. The bottom part of a fold is called a syncline. The sides of a fold are the limbs. The anticlines stand as hills and syncline as valleys.

**TYPES OF FOLDS**

**SYMMETRICAL FOLD**- limbs are equal. Equal pressure comes from either side.

**ASYMMETRICAL FOLD**- Pressure is greater from one side. One limb is steeper than the other.

**OVERFOLD**- One limb is pushed over the other.

**OVERTHRUST FOLD/THRUST FAULT/NAPPE**- Pressure causes the strata to fracture. One side of the fold slides along the line of fracture called a fault

**LANDFORMS ASSOCIATED WITH FOLDING**

**FOLD MOUNTAINS**

The anticlines form ridges and synclines for valleys. Slopes are steep and the mountain peaks are sharp and jagged. Almost all fold mountain ranges are along plate boundaries.

**Effect of fold mountains on people**

Tourism can be an important activity especially snow skiing.Hydroelectric power stations can be found in fold mountains because of high rainfall and steep slopes.Agriculture is limited to sheep and cattle rearing because of the steep slopes.Population densities are low in these regions.

**FAULTING**

A fault is a crack which forms in rocks as a result of continuous tension and compression.

Faulting is caused by forces of **compression** or **tension.** Fault line is a line along the surface of the Earth where a fault occurs.

**TYPES OF FAULTS**

**NORMAL FAULT**- This is caused by forces of tension.

**REVERSE FAULT**- Is caused by forces of compression.

**TRANSFORM/TEAR FAULT**- Tearing forces cause rocks to move past each other laterally.