***LIFE SCIENCES***

***GRADE 10***

***HISTORY OF LIFE ON EARTH***

***FOSSIL FORMATION AND METHOD OF***

***DATING***

1. **FOSSILS**

**TERMINOLOGIES**

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| **TERMINOLOGIES** | **DEFINITIONS** |
| 1. **Fossils** | **Remains of ancient life forms preserved in the rocks** |
| 1. **Palaeontology** | **Study of fossils** |
| 1. **Petrify** | **Turn to stone** |
| 1. **Imprint** | **Left behind when organisms start to decay before becoming petrified** |
| 1. **Strata** | **Layer in which sedimentary rocks pile up** |
| 1. **Index fossil** | **Fossils which have occurred in a particular period of time and then used to determine the age of the other fossils by comparison with them** |
| 1. **Amber** | **Hardened form of liquid sap** |
| 1. **Relative dating** | **Method of dating which finds the age of a fossil by comparing it to another fossil of geological event** |
| 1. **Radiometric dating** | **Method of dating which estimates when was a particular fossil formed** |
| 1. **Fossil tourism** | **Type of ecotourism where main attraction its fossil** |
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**Fossils can be trapped in**

* **Ice**
* **tars**
* **Dried Sap of trees**
* **Rocks**

FOSSIL FORMATION

The richest sources of fossils are found in the sedimentary rocks form

Sand and slits from the land is carried to the seas and swamps by rivers. The remains of dead organisms settle to the bottom. The mineral salts also settle to the bottom. The mineral salts then filter into the body of the dead organism. The organism becomes petrified; this means it turns into stone.

An imprint is left behind when organisms start to decay before it becomes petrified. Therefore, some fossils are actual organisms or part of the dead organism while others are just imprints. Imprints are just outlines of the dead organism or parts of it in the stone.

Sedimentary rocks pile up over each other over millions of years. They piled up layers are called **strata.** The oldest is at the bottom and the youngest at the top. Certain fossils are found in certain layers. This means that fossils were formed in a particular period time.

Index fossils give an indication of the time period in which they were formed, they have a wide geographic distribution. This means that they are found in a large number of places.

**EXAMPLES OF FOSSILS**

* Bones
* Shells
* Tracks (foot prints), hardened faeces of animals
* Petrified tree trunks
* Imprints of leaves and small animals

**EXAMPLE OF FOSSILS THAT OCCUR IN TAR AND ICE…….**

* Fossils of woolly mammoth (ice)
* Pits of tar contained bones of the sabre toothed cats
* Some insects

**DETERMINING THE AGE OF FOSSILS**

There are **two** methods used to determine the age of the fossils

1. ***RELATIVE DATING***

* Does not give the exact age of the fossil
* Able to tell whether the fossil is formed before or after another fossils or geological event
* Age of the fossil is worked by comparing it to another fossil or geological event
* If the original stratification in a rock is undisturbed, scientists is able to tell that the fossil in a lower layer was formed before the one found in the upper layer
* If the upper layer is upset, it is not easy to compare the age of one fossil to another
* Scientists are able to use the **index fossil**

If a new fossil and index fossil are found in the uppermost layer of the rock, then scientists can tell that

* The rock came from the lower layer
* The original layering was upset by geological event
* The new fossil was formed before the other fossil

1. ***RADIOMETRIC DATING***

* Tries to find out how long a particular fossil was formed
* Radio comes from a word radioactive
* Radioactive describe substances that give off nuclear radiation
* Nuclear radiation is useful because radioactive substances decay at a fixed rate

**PROCESSES OF RADIOMETRIC DATING**

* **Living organisms contain carbon – 12 and carbon – 14**
* **Carbon -14 is radioactive**
* **When organism dies, carbon 14 turns becomes nitrogen -14**
* **Carbon -14 turns into nitrogen -14 at a fixed rate**
* **Scientist are able to able to work out the age of the fossil by comparing the ratio of carbon -14 to the total carbon and nitrogen -14**

***ACTIVITIES***

**ACTIVITY 1.1**

**CHOOSE THE CORRECT ANSWER FROM THE FOUR POSSIBLE OPTIONS PROVIDED:**

1. The solid formed from the hardening of the liquid sap of tress is called….
2. Amber
3. Sapped
4. Ice
5. Tar
6. The process of finding out the age of rocks and fossils using radioactive elements
7. Relative dating
8. Palaeontology
9. Timing
10. Radiometric dating
11. The process of finding out the age of fossils by comparing it with another fossil or rock
12. Relative
13. Palaeontology
14. Timing
15. Radiometric
16. Substances which give nuclear radiation and decay into other substances
17. Relative
18. Radioactive
19. Radiometric
20. Reactive

***ANSWERS:***

1. A
2. D
3. A
4. B

***ACTIVITY 1.2***

**TEACHER’S ACTIVITY**

1. Divide the class into four groups and five. Ask each group to organize a set of 45 media (magazines, newspapers periodicals). Each group must have an exclusive type of media, one group could bring newspapers, the other magazines, etc. if possible the group must have items from the same source, i.e. one group will have copies of “Drum magazine” the other may have “Vaal Ster” etc.
2. Now ask each group to stack the items on the table in such a way that if someone wants to find a particular issue, he/she could find it easily.
3. To add some fun, get the groups to ask the other groups for an item from their collection and time how long it takes to find the item. The more organised the method, the faster the service will be the idea is to get them put oldest at the top and the more recent at the bottom.
4. Remind them about the basic principles of relative age relationships they learnt in the previous lesson and have a general discussion to explain relative dating and to index fossils.

**LEARNER’S ACTIVITY**

1. Learnersto listen, follow instructions and complete the task, ask and answer questions
2. Classroom discussion
3. HOMEWORK:

Provide the disadvantages of this method of dating fossils

***FOSSIL FORMATION***

The diagram below shows a hypothetical rock from locations separated by a distance of 67 KM. Layers D and L are volcanic ash deposits and all the other layers are sedimentary rock.