GRADE 10

LIFE SCIENCE

WORKBOOK 2021

TOPIC 9 BIOSPHRE TO ECOSYSTEMS

TOPIC 10 BIODIVERSITY AND CLASSIFICATION

TOPIC 11 HISTORY OF LIFE ON EARTH

WELCOME GRADE 10's

This workbook has been created for the student, to be used as primary learning aid for the Life Sciences Grade 10 curriculum.

It covers all necessary content, and includes exercises and activities to test your knowledge on the content covered.

Memorandums for exercises and activities will only be provided when proof can be given that the exercise/activity has been completed by the student.

The student will receive a calendar that should be used in conjunction with the workbook as a guideline for work to be completed each day. Please write the date next to each day's work in the space provided.

Please make sure that workbooks and textbooks are covered accordingly.

The formal assessments for 2021 will be as follow:

Term 1	Term 2	Term 3	Term 4
PRACTICAL TASK (10%) (minimum 30 marks)	**ASSIGNMENT (20%)** (minimum 50 marks)	**PRACTICAL TASK (10%)** (minimum 30 marks)	**FINAL EXAMINATION** Paper 1 + Paper 2 Duration: 2½ hours for each paper 150 marks for each paper
TEST (20%) (minimum 50 marks)	**TEST (20%)** (minimum 50 marks)	**TEST (20%)** (minimum 50 marks)	
TOTAL: 100%			
60%			**40%**

I look forward to working with you this year. If we put in the necessary effort and stay motivated, 2021 will be a success.

Kind regards,

Mrs. T.A Farmer

Life Sciences Grade 10

Topic 9

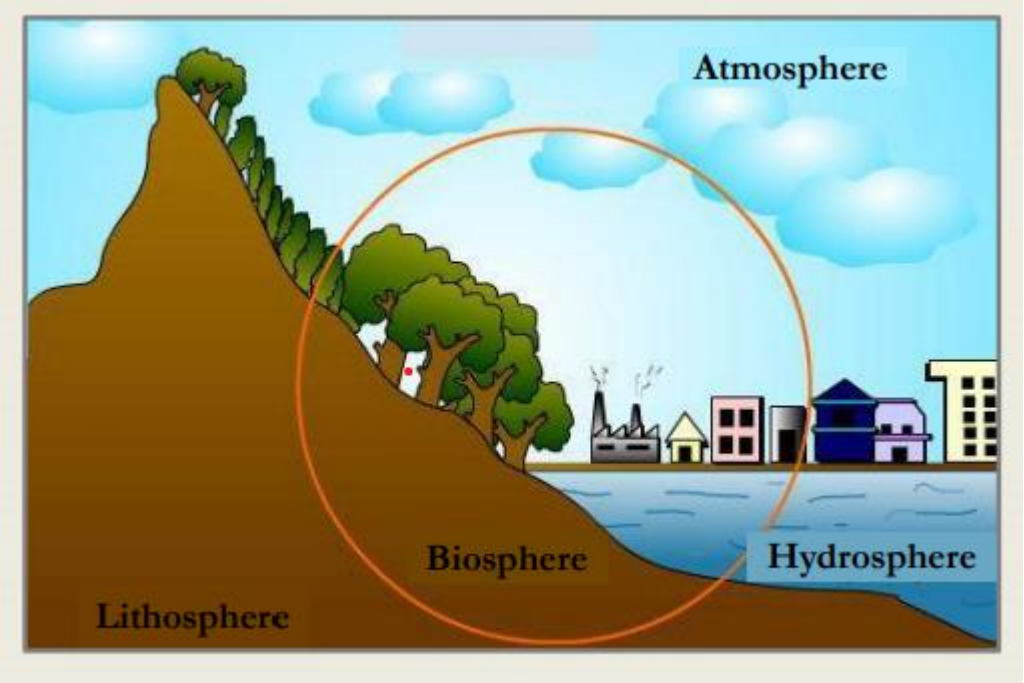
BIOSPHERE TO ECOSYSTEMS

Content

- **Biosphere:** Concept of the biosphere. Interconnectedness with and components of global ecosystems: hydrosphere, lithosphere, atmosphere.
- **Biomes:** Terrestrial and aquatic biomes of Southern Africa: how climate, soils and vegetation influence the organisms found in each. Location of different biomes in South Africa.
- **Environment:** Concept of environment to show human activities in and interactions with the natural environment Abiotic and biotic factors and their effect on the community.
- **Ecosystems:** Concept of ecosystem. Structure and ecosystem functioning.
- **Energy flow:** Energy flow through ecosystems and the relationship to trophic structure. Trophic levels.
- **Cycles:** Flow charts of, CARBON, NITROGEN, WATER, OXYGEN.

Day 1 **Date:**

- The **BIOSPHERE** is the global sum of all ecosystems.
- It is that part of the earth's surface where life is possible.
- The different components of the biosphere are the **lithosphere**, **hydrosphere** and **atmosphere**.
- The biosphere is divided into an **abiotic**, or non-living component and a **biotic**, or living component.
- A constant interaction between the biotic and abiotic components in the lithosphere, hydrosphere and atmosphere is responsible for the exchange and conversion of food, energy and other essential substances to make life on earth possible.

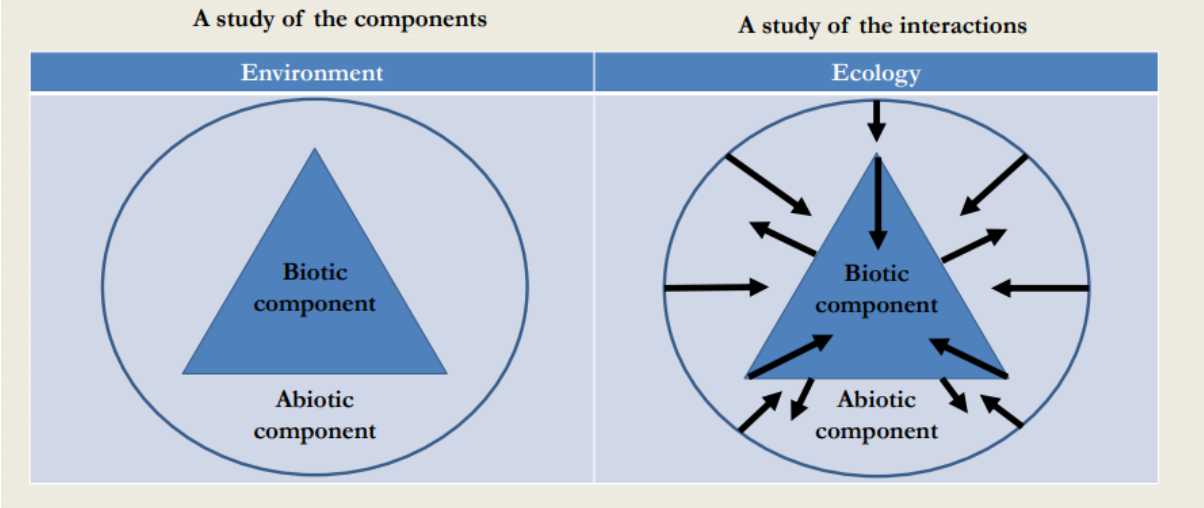


- The Earth's **LITHOSPHERE** consists of the earth's crust including the upper solid mantle just below the crust.
- The lithosphere (continental crust) is the home of land animals and plants as well as various microorganisms.

- The **HYDROSPHERE** is the liquid water component of the Earth. It includes oceans, lakes, dams, rivers, streams as well as groundwater and cover about 70% of the Earth's surface.
- Many plants, animals and microorganisms live in the hydrosphere.
- The water in the hydrosphere continuously circulates to form the water cycle.

- The **ATMOSPHERE** is the layer of gases surrounding the earth and is held in place by the earth's gravitation.
- The Earth's atmosphere consists mainly of nitrogen, but also contains oxygen which is used by most organisms for respiration as well as carbon dioxide which is used by plants, algae and blue-green bacteria for photosynthesis.
- The atmosphere also protects organisms against genetic damage through the ultraviolet rays of the sun.

- The concepts **ENVIRONMENT** and **ECOLOGY** are often used as synonyms, although there is a distinction between these two terms.
- The **environment** is the total sum of all living organisms, including the natural, non-living factors (abiotic factors) as well as all living organisms (biotic factors) that contribute to growth and development, but also cause harm and/or danger.
- **Ecology** is the study of interactions and processes that exist between organisms and between organisms and the environment.



Test yourself:

Complete **ACTIVITY 1** on page 198 in your Life Science, Via Afrika textbook.

Complete **ACTIVITY 2** on page 199 in your Life Science, Via Afrika textbook. **(Scientific skills)**

Day 2 and 3 **Date:**

- The **ABIOTIC COMPONENT** is the non-living chemical and physical factors of the environment.
- Abiotic factors are very important and greatly affect the biotic factors.

- We will discuss the following abiotic factors of the environment:
  - **Physiographic factors**

    -Slope

    Refers to how steep, or how flat an area is.

    Steep slope: *Fast water run-off, leads to soil erosion.*

    -Aspect

    The direction that the area faces.

    North-facing *slopes will receive more direct sunlight*

    South-facing *slopes will receive more shade.*

    -Altitude

    The ***height*** *of the land above sea level.*

    Higher altitudes the wind speed is greater, temperature lower and rainfall higher.

    Lower altitudes the wind speed is slower, temperature higher and rainfall lower.
  - **Edaphic (soil) factors**

    -pH level

    Acidic soil *has a pH of less than 7.*

    Alkaline soil *has a pH of greater than 7.*

    -Hummus content

    More hummus will increase the fertility of the soil.

    -Soil texture

    Sandy soil: *Soil particles are large, low water retention.*

    Loam soil: *Mixture of sand and clay.*

    Clay soil: *Soil particles are waterlogged, high water retention.*

    Soil air

    Spaces found between the soil particles.
  - **Physical factors**

    -Sunlight

    Photoperiodism*: Organisms response to the length of day and night.*

    -Temperature

    Some organisms ***hibernate*** *in winter (colder temperatures)*

    Some organisms ***aestivate*** *in summer (warmer temperatures)*

    -Water

    Hydrophytes are adapted to live in water. ***(Summarise P.216)***

Reptiles are adapted to conserve water. ***(Summarise P 217)***

-Wind

Test yourself:

Complete **EXERCISE 3** on page 218 in your Life Science, Via Afrika textbook.

Day 4 **Date:**

- The **BIOTIC COMPONENT** of an ecosystem is the biodiversity of the ecosystem and consists of a large variety of living organisms including plants, animals, fungi, algae, protozoa and bacteria.
- Each of these organisms interacts with the abiotic environment as well as the other living organisms in their specific ecosystem. Humans also form part of the biotic component.
- In terms of nutrition, each organism has a specific position within the ecosystem:
  - Green plants are the primary producers who produce food through the process of photosynthesis. Green plants produce their own organic food and are therefore **autotrophic.**
  - Autotrophs are divided into:
    - **Hydrophytes** – plants that grow in water
    - **Mesophytes** – plants that need moderate supply of water and food
    - **Xerophytes**– plants that grow in very dry conditions
  - Organisms that cannot produce their own food are **heterotrophic.**
  - Heterotrophs are divided into:
    - **Herbivores** – consume plants
    - **Carnivores** – consume meat
    - **Omnivores** – consume both meat and plant material
    - **Saprophytes** (Decomposers) – plants that live on dead organic matter ◦
    - **Parasites** – plants or animals feeding on other living organisms

Test yourself:

Complete **EXERCISE 2** on page 212 in your Life Science, Via Afrika textbook.

Day 5, 6 and 7 **Date:**

- **Biomes** are large areas with a specific climate. The area contains specific kinds of plants and animals.

Table indicating the different Marine Biomes of South-Africa

The ocean tides, currents, temperature changes and how much oxygen and salt is in the water all have an effect on the kinds of animal and plant communities found along the coastline.

Biome	**Features**	**Plants**	**Animals**	**Threats**
Sandy beaches	*-Moving layer of sand -Ocean meets land* ***(Intertidal zone)***	*Continual changes to environment prevent plants from growing.*	*-Plough snail -White mussel -Ghost crab*	*-Pollution -Beach vehicles -Human development*
Rocky shores	*-Habitat of great diversity -Along coastline*	*-Different species of seaweeds*	*-Mussels -Oysters*	*-Pollution brought by rivers (Sewage) -Human interaction.*
Coral reefs	*-Marine organism that grows in colourful clumps.*	*-Large diversity of plant species.*	*-Largest diversity of marine animal life.*	*-Collecting coral -Overfishing -Global warming*
Open sea	*-No firm base*	*-Algae Phytoplankton*	*-Diversity of fish*	*-Pollution from ships -Overfishing*
Estuaries	*-Meeting place of rivers and the sea. -Freshwater meets saltwater*	*-Organisms must be specially adapted to live here -Diversity of*	*-Organisms must be specially adapted to live here -Diversity of*	*-Leaching and eutrophication into rivers can cause harm to estuaries.*

		different plants grow here.	*different animals live here.*	

Table indicating the different Terrestrial Biomes of South-Africa

Biome	**Features**	**Plants**	**Animals**	**Threats**
Savanna	*-Mixed grasslands and trees.* *-46% of South Africa.* *-Summer rainfall with hot temperatures.*	*-Baobab, Mopani and Acacia trees.*	*-Wild animals* *-Livestock that graze grasses.*	*-Hunting* *-Unfriendly tourism.*
Grassland	*-Grass as main vegetation* *-24% of South Africa.* *-High rainfall and thunderstorms in summer and frost in winter.*	*-Diversity of different grass species.*	*-Diversity of antelope.* *-Variety of birds.*	*-Commercial forestry and farming.*
Nama Karoo	*-Warm/dry semi-desert climate.* *-Sandy soil with little nutrition.*	*-Sweet thorn* *-Stone plant* *-Karoo daisy*	*-Variety of rodents* *-Ostrich* *-Reptiles*	*-Overgrazing*
Succulent Karoo	*-Winter rainfall with very hot/dry summers.*	*-Succulent plants with thick fleshy leaves.* *-Annual plants*	*-Dassie rat* *-Barking gecko.*	*-Overgrazing*

	-Sandy soil with little nutrition.			
Fynbos	*-Western Cape forest.* *-Declared world heritage site.* *-Cold wet winters, hot dry summers.*	*-Evergreen plants.* *-Diversity of shrubs.* *-8570 species of flowering plants, fynbos is one of the most diverse floras in the world.*	*-Grysbok* *-Mountain zebra* *-Leopard*	*-Development* *-Uncontrolled fires.* *-Alien plants* *-Global warming.*
Forest	*-High rainfall* *-Very small part of South African biomes*	*-Diversity of trees* *-Ferns and vines*	*-Blue duiker* *-Knysna loerie*	*-Deforestation* *-Development*
Thicket	*-Sandy and clay soil* *-Found in river valleys*	*-Diversity of shrubs, evergreen forest and succulents.*	*-Monkeys* *-Squirrels.*	*-Deforestation* *-Development*

Table indicating the different Freshwater Biomes of South-Africa

Freshwater refers to rivers, streams, ponds, lakes and wetlands. Climate change affects these biomes.

Biome	**Features**	**Plants**	**Animals**	**Threats**
Wetlands	*-Soil is waterlogged* *-Aids in flood control* *-Improves water quality by trapping*	*-Plants that provide food and shelter for many animals.*	*-Wildlife* *-Wetland crane*	*-Pollution due to dumping large amounts of waste.*

	dangerous sediments			

Test yourself:

Complete **EXERCISE 1** on page 207 in your Life Science, Via Afrika textbook.

Day 8 and 9 **Date:**

Why do we eat???

We eat to get energy for all the different processes to keep us alive. (And also to get a source of carbon and other organic molecules that build our bodies.)

All organisms need energy for growth, movement and reproduction. The energy in ecosystems comes from the sun and flows in one direction only: to producers, to consumers, to decomposers.

Producers change the sun's energy into chemical energy through photosynthesis.

Primary consumers (herbivores) consume the producers.

Secondary consumers (carnivore/omnivore) consume primary consumers.

Decomposers (fungi and bacteria) get their energy from the bodies and waste of dead producers and consumers.

Food chains: Show the energy flow from one organism to the next. Set out as a flow diagram. Each level of the food chain is called a trophic level.

(Draw your own P 219)

Food web: Made of several interlocking food chains.

(Draw your own P 220)

Test yourself:

Complete **CASE STUDY 1** on page 220 in your Life Science, Via Afrika textbook.

Day 10 and 11 **Date:**

Food pyramid: Pyramidal shapes that show how much is eaten at each trophic level.

- Pyramid of energy

At each trophic level about 90% of the energy is lost as heat. The total energy passed from one level to the next is about 10%. This indicates that the amount of energy decreases towards the tip of the pyramid.

This means that the total amount of energy stored in the bodies of a given population depends on its trophic level.

(Draw your own P221)

- Pyramid of biomass

A count of the population, multiplied by the weight of an average individual in it, gives an estimate weight of the population. The total mass of living organisms at one trophic level.

(Draw your own P222)

Test yourself:

Complete **ACTIVITY 4** and **EXERCISE 4** on page 222 and 223 in your Life Science, Via Afrika textbook.

Day 12, 13 and 14 **Date:**

NUTRIENT CYCLES

- **Water cycle**

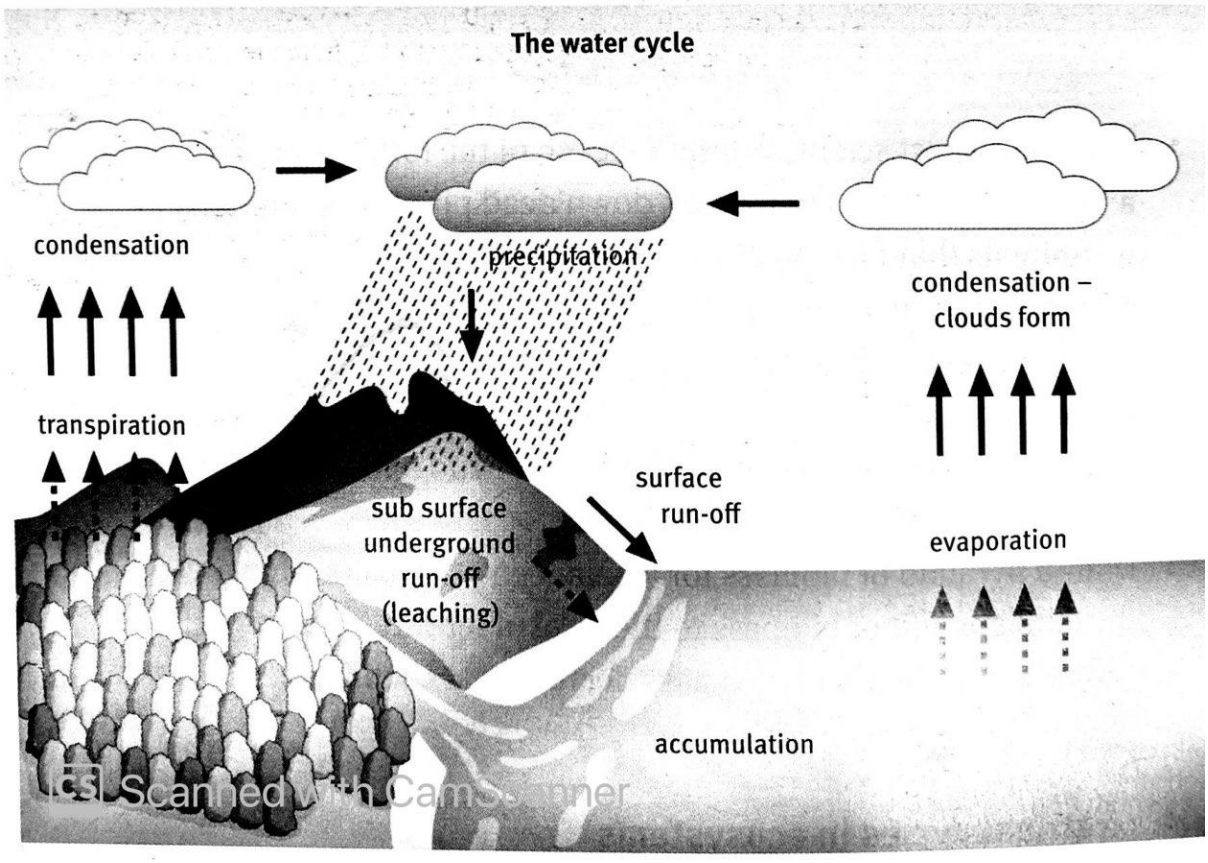


Image also available in Life Science, Via Afrika textbook, Page 224

(Summarise in words P 223)

- **<u>Carbon cycle</u>**

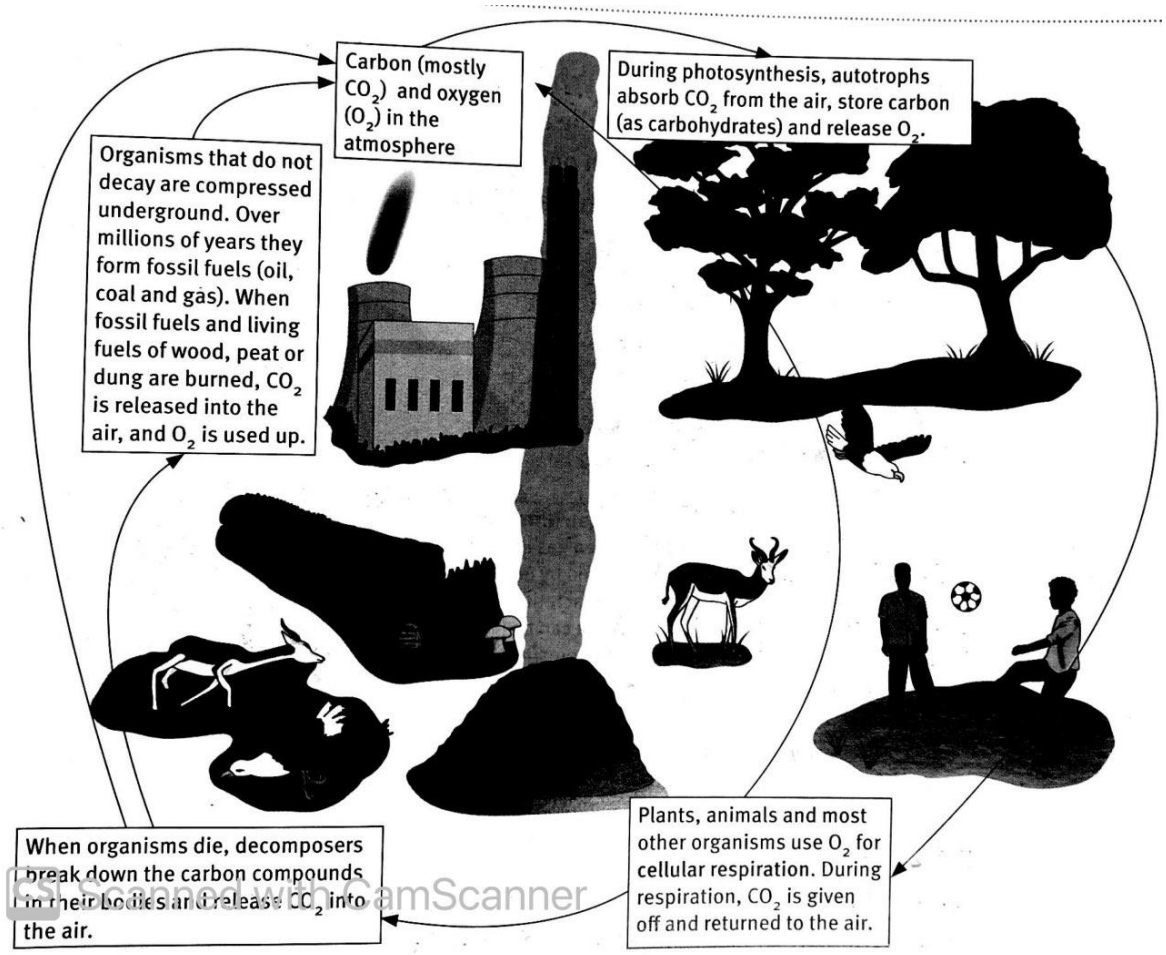


Image also available in Life Science, Via Afrika textbook, Page 225

(Summarise in words P 224)

- **Nitrogen cycle**

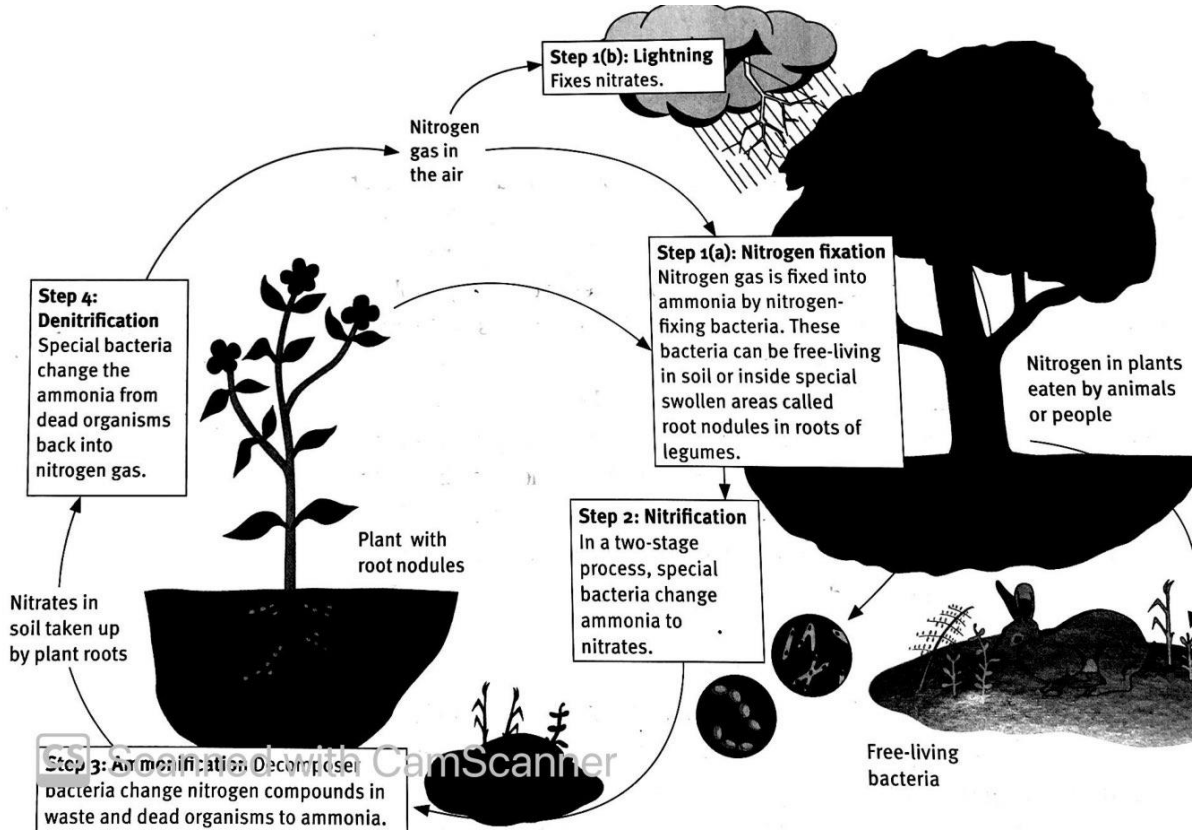


Image also available in Life Science, Via Afrika textbook, Page 226

(Summarise in words P 225)

- **Oxygen cycle**

  Draw your own oxygen cycle

  (Summarise in words P 226)

Test yourself:

Complete **EXERCISE 5** on page 227 in your Life Science, Via Afrika textbook.

Day 15 to 20: Revise Topic 9. Additional revision activities will be provided and class discussions and debates (if possible) will be held to lay down knowledge.

Complete **TOPIC QUESTION** on page 239 in your Life Science, Via Afrika textbook.

END TOPIC 9

Topic 10

BIODIVERSITY AND CLASSIFICATION

Content

- **Classification schemes:** Brief history of classification
- **Classification systems:** Five-kingdom system; Animalia, Plantae, Fungi, Protista and Monera.
- **Binominal naming system:** History and application

Day 21 and 22 **Date:**

BIODIVERSITY

Read through pages 246-249 in Life Science, Via Afrika textbook and complete **CASE STUDY 1 AND 2** on page 250 and 251 to test yourself.

Day 23 **Date:**

CLASSIFICATION

Classification/Taxonomy is the sorting and grouping of organisms with similar features. Taxonomy has two branches:

Nomenclature: Naming of organisms

Systematics: Placing organisms into groups

HISTORY OF CLASSIFICATION

- 1758, Swedish botanist, Carolus Linnaeus, introduced a system to classify things.
- Carolus Linnaeus is also the founder of binominal nomenclature.

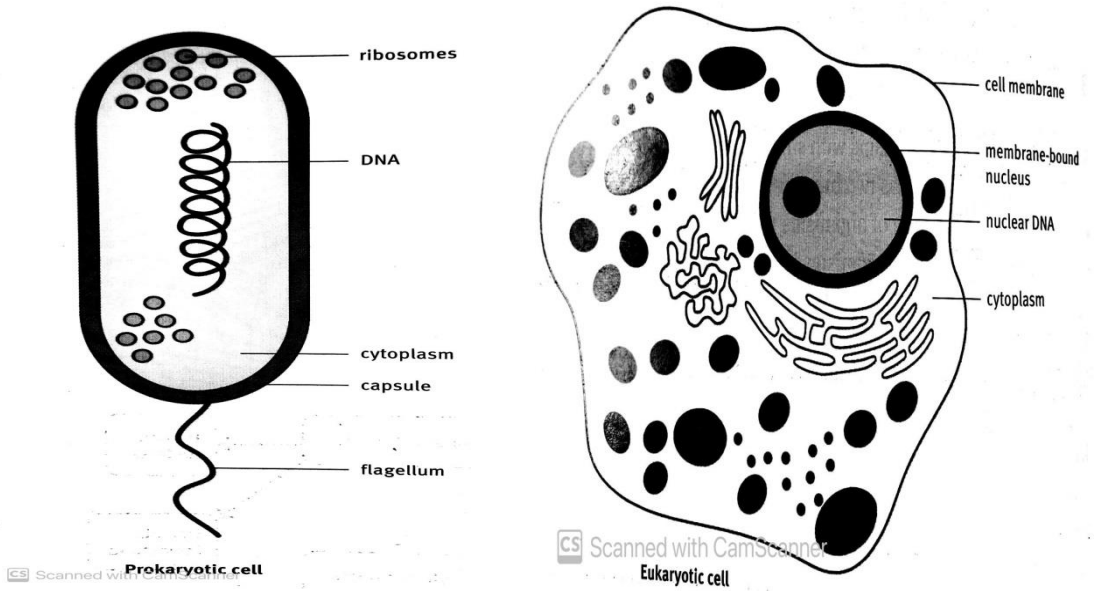
- The five kingdom system was developed by an American, Robert Whittaker, in 1969:
  Kingdom: **Monera** (**prokaryotic** organsims such as bacteria)
  Kingdom: **Protista** (primitive **eukaryotic** organisms such as algae)
  Kingdom: **Mycota** (only fungi like mushrooms)
  Kingdom: **Metaphyta or Plantae** (advanced eukaryotic plants)
  Kingdom: **Metazoa or Animlia** (all multicellular animals)
- 1990 an Americam microbiologist Dr. Carl Woese developed a three domain system, with kingdoms in each:
  Eubacteria: Prokaryotic bacteria
  Archaea: Bacteria that are prokaryotes and live under extreme conditions.
  Eukarya: Kingdoms Protista, Fungi, Plantae and Animalia

Day 24 **Date:**

ORGANISMS CLASSIFIED PROKARYOTES AND EUKARYOTES

Prokaryotic cells are more primitive and existed before proper nuclei developed

Eukaryotic cells have a membrane bound nucleus.



Images also available in Life Science, Via Afrika textbook, Page 252

Test yourself:

Complete **EXERCISE 1** on page 253 in your Life Science, Via Afrika textbook.

Day 25 **Date:**

FIVE KINGDOM CLASSIFICATIONS

The following characteristics about feeding are important when it comes to the five kingdom system:

Autotrophic: Organisms that produce their own food through light energy

Heterotrophic: Organisms that need to eat other organisms to gain energy.

Saprotrophic: Organisms feed on dead plant and animal material

BINOMINAL NAMING

- Latin names

Scientific names are set in Latin language. The first part of the name is called the **generic/genus** name and the second part is the **specific/species** name.

The genus name begins with a capital letter e.g. Homo.

A species is a group of organisms that look alike, can interbreed and produce fertile offspring. The species name is written with a small letter e.g. sapiens.

(Biological names must be printed in italic or underlined if you are writing by hand: *Homo sapiens* or Homo sapiens.)

Day 26 and 27 **Date:**

- Classification keys

Classification keys are used to name and identify unknown plants and animals. A key is a list of features that can be seen and compared to the unknown organisms. It can also be called a **dichotomous key**.

Complete EXERCISE 2 below as an example of how to use a dichotomous key.

Test yourself:

Complete **EXERCISE 2** on page 256 and **EXERCISE 4** on page 258 in your Life Science, Via Afrika textbook.

Day 28 to 31: Revise Topic 10. Additional revision activities will be provided and class discussions and debates (if possible) will be held to lay down knowledge.

Complete **TOPIC QUESTION** on page 260 and 261 in your Life Science, Via Afrika textbook.

END TOPIC 10

Topic 11

HISTORY OF LIFE ON EARTH

Content

- **Geological timescale:** Meaning and use of timescales (details not to be memorized).
- **Cambrian explosion:** Origins of early forms of all animal groups. Life-forms have gradually changed to become present life-forms. In the last four million years significant changes have occurred in species occurring in Africa (e.g. humans)
- **Mass extinctions**: Causes of mass extinction. There have been five, two of which are particularly important: 250mya (resulted in the extinction of about 90% of all life on Earth) and 65mya (resulted in the extinction of many species, including the dinosaurs). The rate of extinction on the Earth at present is higher than at any time in the past. The present time has been called the sixth extinction.
- **Fossil formation and methods of dating**: Transitional fossils: Coelacanth, Archaeopteryx, Thrinaxodon. Both methods of fossil dating, radiometric dating and relative dating.

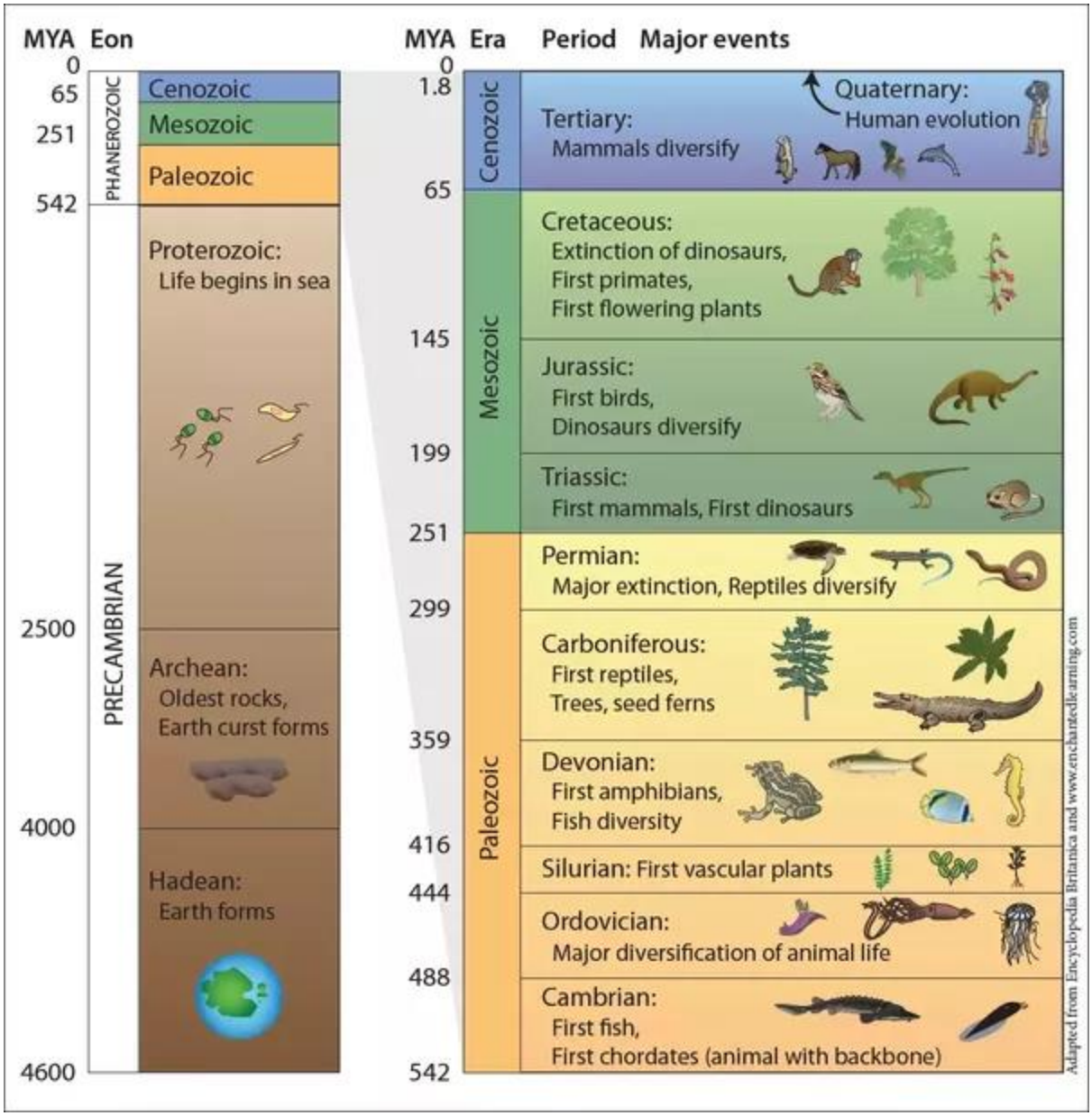
Day 32, 33, and 34 **Date:**

GEOLOGICAL TIMESCALE

Palaeontologists have made a calendar of events in Earth's history called the **geological timescale.**

This timescale shows how species evolved over time from ancestors that existed in the past but they look different because they change over long periods of time.

All time is subdivided into units in descending order of era's and periods.



Test yourself:

Complete **ACTIVITY 1** on page 263 in your Life Science, Via Afrika textbook.

Day 35 and 36 **Date:**

CAMBRIAN EXPLOSION

The Cambrian period lasted for 38 million years. Compared to the age of the earth, all major groups of animals appeared on Earth in a very short period of time. In the first 5-20 million years all major groups of animals appeared known as: Platyhelminthes (flat worms), Nematoda (worms), Annelida (segmented worms), Mollusca (slugs, snails and creatures with shells), Arthropoda (invertebrates with external skeleton), Echinodermata (marine invertebrates) and Chordata (vertebrates- with skeleton).

From end Cambrian into Holocene, the fossil record shows that different groups of animals evolved out of those primitive Cambrian forms:

Fish: about 438 million years ago

Amphibians: about 380 million years ago

Reptiles: about 225 million years ago

Birds: about 180 million years ago

Mammals: about 150 million years ago

Humans: about 250 000 years ago

Life forms have changed gradually to become the forms we see on earth today.

Day 36, 37 and 38 **Date:**

MASS EXTINCTIONS

Periods in Earth's history when the biodiversity has suffered a crash, with the number of species enormously reduced is known as a mass extinction.

There have been five mass extinctions:

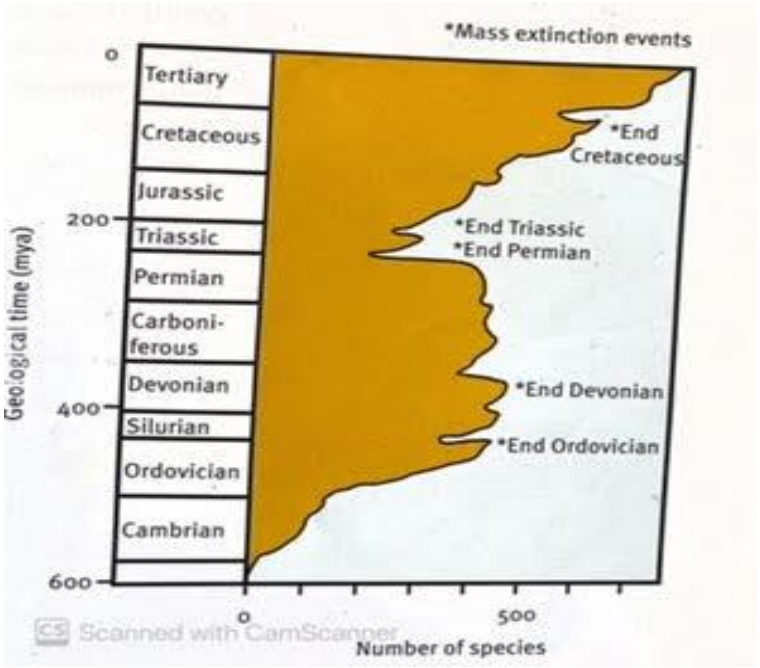
FIRST: end Ordovician period (450 million years ago)

SECOND: at the end of Devonian period (375 million years ago)

THIRD: the Permian in the Triassic period (251 million years ago)

FOURTH: at the end of Triassic period (205 million years ago)

FIFTH: Cretaceous in the Tertiary period (65 million years ago)



Causes of mass extinction

Two theories that caused mass extinction:

- Environmental disasters, for example asteroid impacts, severe volcanism or killer disease.
- Organisms not adapting to habitat or environmental changes, such as changing temperatures and continental drift.

- **Cooling of the atmosphere that causes the Ice Age**: If the earth begins to cool down, glaciers form that covers a part of the earth's surface for long periods of time, which leads to: ocean levels dropping, decrease in oxygen levels, change in natural environment.
- **Continental drift**: Movement of continental plates apart or together over periods of time, many million years ago. One big land mass called **Pangaea** that broke into **Laurasia** in the Northern hemisphere and **Gondwanaland** in the Southern hemisphere. Scientists have found identical plant and animal fossils in South-America and Africa proving that these two continents were once joined.
- **Plate tectonics**: The earth's crust is made of 8 major plates that fit together like a puzzle. The plates lie on top of hotter, less solid material which allows the plates to move apart. Plate movement can cause vulcanicity which blocks sunlight, or force larger blocks upward, so they experience cooler temperatures.
- **Volcanic activity**: Scientists believe that volcanism was the main cause of three of the known mass extinctions. The eruptions caused huge clouds of dust to be blown into the atmosphere, blocking out the sun's rays. This reduced solar radiation and led to the rapid cooling of the earth.
- **Killer disease**: The change in climate can also lead to the spread of deadly disease. Bacterial or viral invasion can kill large numbers of organisms.
- **Asteroids and Meteorites**: These can crash onto our planet from outer space and vaporise huge amounts of rock, blow it into the atmosphere and block the sun's rays.

Summarise in your workbooks the theory of how the dinosaurs became extinct.

Test yourself:

Complete **EXERCISE 2** on page 269 in your Life Science, Via Afrika textbook.

Day 38 and 39 **Date:**

SIXTH MASS EXTINCTION

At present the rate of extinction is higher than any time in the past. Scientists estimate that about three species an hour are becoming extinct.

This wave of extinction is mainly caused by humans. The human population is growing at such a fast rate, and humans are each having more of an impact on Earth. During the last 100 years, human impact on the natural environment has risen dramatically. These changes destroy the habitat of species and they die out.

Industrial activity causes:

-Greenhouse gases in the atmosphere resulting in global warming

-Air, land and water pollution, which also causes acid rain.

-Ozone depletion, which affects climate.

-Deforestation

The increase in agricultural land and urban areas causes:

-Widespread habitat destruction of every kind of biome, affecting huge numbers of organisms, through agriculture and overpopulation.

-Soil degradation through monoculture, over farming and deforestation.

Test yourself:

Complete **EXERCISE 3** on page 271 in your Life Science, Via Afrika textbook.

Day 40 and 41 **Date:**

FOSSILS

A **fossil** is the remains, impression or trace of ancient life forms, which have been preserved in Earth's crust for thousands of years. The study of fossils is called **paleontology** and the process by which dead organisms or their parts are changed into fossils is called **fossilization.**

The **process** at which fossils form in sedimentary rock happens over thousands of years and usually happens as follows:

- An animal walks on river bank, and drowns.
- The body is covered in mud.
- The body decomposes.
- Over time the skeleton is buried under more layers of mud and sand.
- The buried skeleton is exposed to high pressures and temperatures.
- The molecules in the bones of the animal are replaced by molecules of silica or carbonate.
- The skeleton eventually turns into rock and becomes a fossil.
- Eventually it might be lifted up to the surface by movement of the Earth's crust, or exposed by erosion and discovered by a paleontologist.

Test yourself:

Complete **EXERCISE 4** on page 275 in your Life Science, Via Afrika textbook.

Day 42 and 43 **Date:**

MISSING LINKS

The **fossil record** is not complete. At times, a new group is discovered with no link to the group from which it has evolved. If and organism is found that is the intermediate between

the old and new groups, it is called the missing link, and causes great excitement in the scientific world.

COELACANTH

Scientists had discovered that coelacanth fossils and thought that the ancient fish had become extinct about 65 million years ago. Then a living specimen-a living fossil-was found in the mouth of the Chulumna river near East London, in 1938.

A living Coelacanth had been discovered. It took fourteen years to find another one.

The coelacanth is a transitional fossil between the fishes and the reptiles and the images below will indicate as to why this is.

Test yourself:

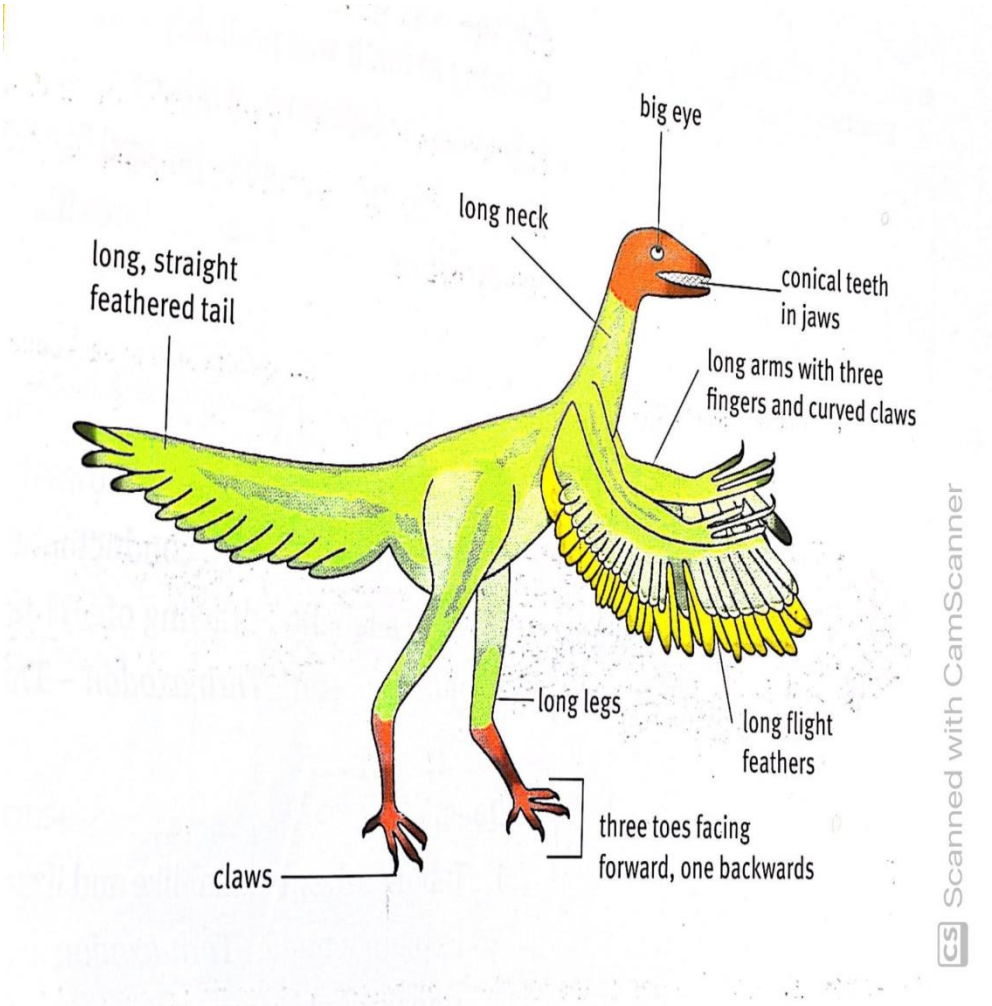
Complete **ACTIVITY 6** on page 277 in your Life Science, Via Afrika textbook.

Day 44 **Date:**

ARCAEOPTERYX

This fossil is believed to be the first known bird. Its fossilized remains were found in the nineteenth century in limestone in Solnhofen, Germany. The archaeopteryx had well-developed wings and could probably fly. Its size was between that of a pigeon and a small crow. In many ways it was like a dinosaur: it had teeth, well-developed hind limbs and a long tail. Unlike a dinosaur, it had feathers growing from each vertebra, and its whole body was

covered with feathers. Evolutionary example that lived during the Jurassic period, 147 million years ago.



Test yourself:

Complete **ACTIVITY 7** on page 278 in your Life Science, Via Afrika textbook.

THRINAXODON

This animal lived during the Triassic period, 248-245 million years ago. Its fossilized remains have been found in South-Africa and Antarctica, which is evidence that the two continents were once joined.

It was cat-sized and had sharp teeth and claws and was a carnivore. It is believed to be the link between reptiles and mammals. Little holes in the skull suggest it had whiskers. It was most probably warm-blooded like mammals, but it laid eggs, and its skeleton had other reptilian features.

Test yourself:

Complete **ACTIVITY 8** on page 278 in your Life Science, Via Afrika textbook.

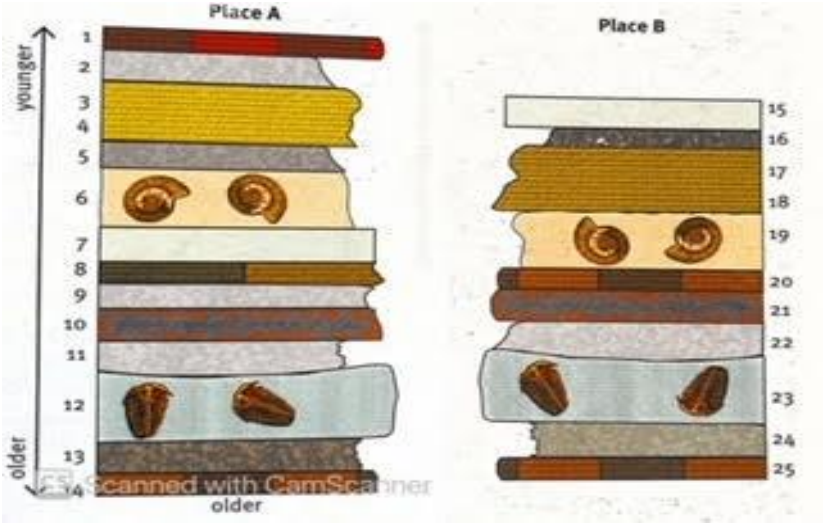
Day 45 **Date:**

METHODS DATING FOSSILS

- **Relative dating**

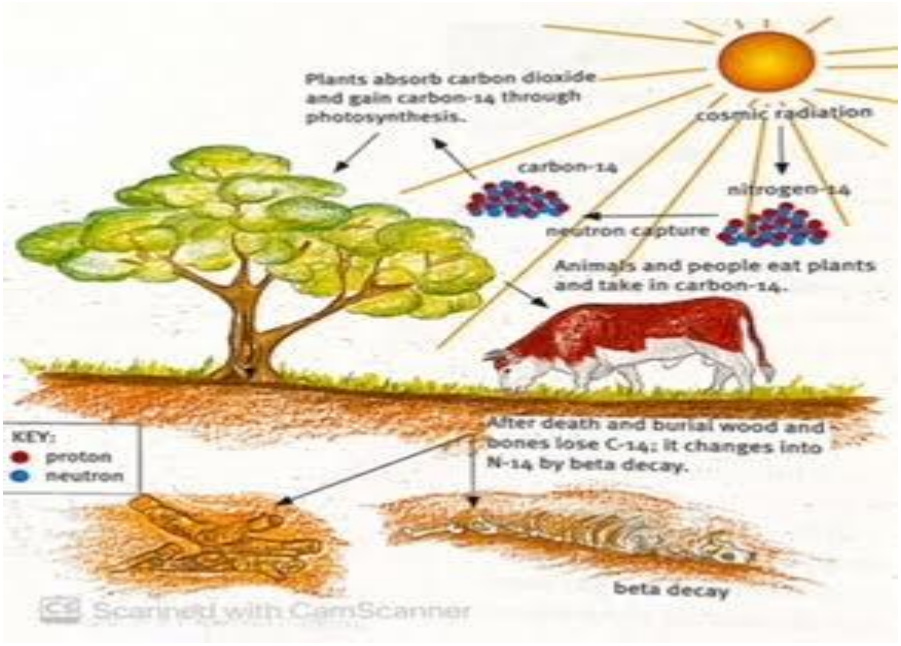
- The age of the fossil is worked out by trying to find out how it is related to the age of another fossil or geological event.

- It can only determine whether a particular fossil was formed after another fossil or geological event.
- If the original layering of rock is still intact, scientists can safely say that a fossil in the lower layer is older than a fossil in the upper layer.
- If an event like an earthquake has upset the layers, it becomes difficult to age the fossil.



- **<u>Radiometric dating</u>**

- Also called absolute dating.
- Radioactive isotopes of certain mineral elements are used.
- Isotopes are different forms of atoms that have unstable nuclei.
- They break down over time to form other elements.
- The rate at which they decay is knowns as the isotopes half-life.
- Scientists can measure the amount of radioactive isotopes in the fossil or the rock in which it is buried.
- Scientists calculate the ratio between the original amount of radioactive isotopes and the amount remaining now.
- They can work out how long ago the fossil died.
- Isotopes of carbon, uranium, potassium and others are used.



<u>Day 46 to 47: Revise Topic 11. Additional revision activities will be provided and class discussions and debates (if possible) will be held to lay down knowledge.</u>

Complete **TOPIC QUESTION** on page 291 in your Life Science, Via Afrika textbook.

<u>END TOPIC 11</u>