Hoërskool Dr. Johan Jurgens

Grade 10 Life Sciences 2024

School Based Assessment

Assignment Term 2: History of Life on Earth

Examiner: **Mr K. Da Gama**

Moderator: **Mrs S. Stoltz**

Duration: **60 minutes** **Total Marks:** **50**

Name: _____

Grade: 10 key __

Instructions:

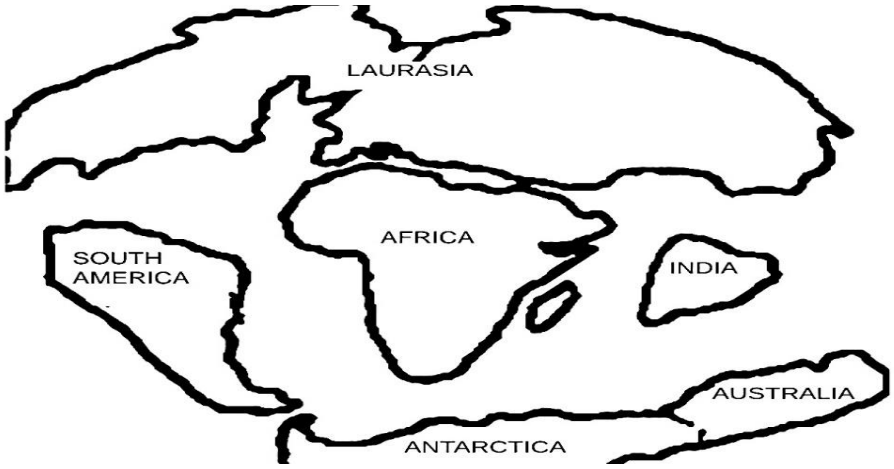
1. Answer ALL the questions.
2. Write ALL the answers in your ANSWER BOOK.
3. Start EACH question at the top of a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Present your answers according to the instructions of each question.
6. ALL drawings should be done in pencil and labelled in blue ink.

QUESTION 1

The theory of continental drift arose from Alfred Wegener back in 1912. The theory states that the continents we see today originated from one large land mass that broke and the parts drifted to the current positions. Wegener explains that the big land mass, called Pangea, first broke into two large land masses which were Laurasia and Gondwanaland. He later suggested that the land masses continued to break apart into smaller fragments approximately 250-200 million years ago. The various parts moved away from each other, turning into the continents we now know on today's Earth.

The diagrams **X**, **Y** and **Z** below shows how land masses moved during continental drift.

Diagram X	
Diagram Y	

Diagram Z	

1.1 Name the scientist that postulated (suggested) the theory of continental drift. (1)

1.2 State the theory of continental drift as given in the passage. (1)

1.3 Arrange the events of continental drift in the correct sequence from the oldest position of the land masses to the present, using letters **X, Y** and **Z.** (3)

1.4 Name the **TWO** large land masses into which the super continent broke. (2)

1.5 Using the diagrams above, state whether the following arose from Laurasia or Gondwanaland:

(a) South America

(b) Eurasia

(c) Africa (3)

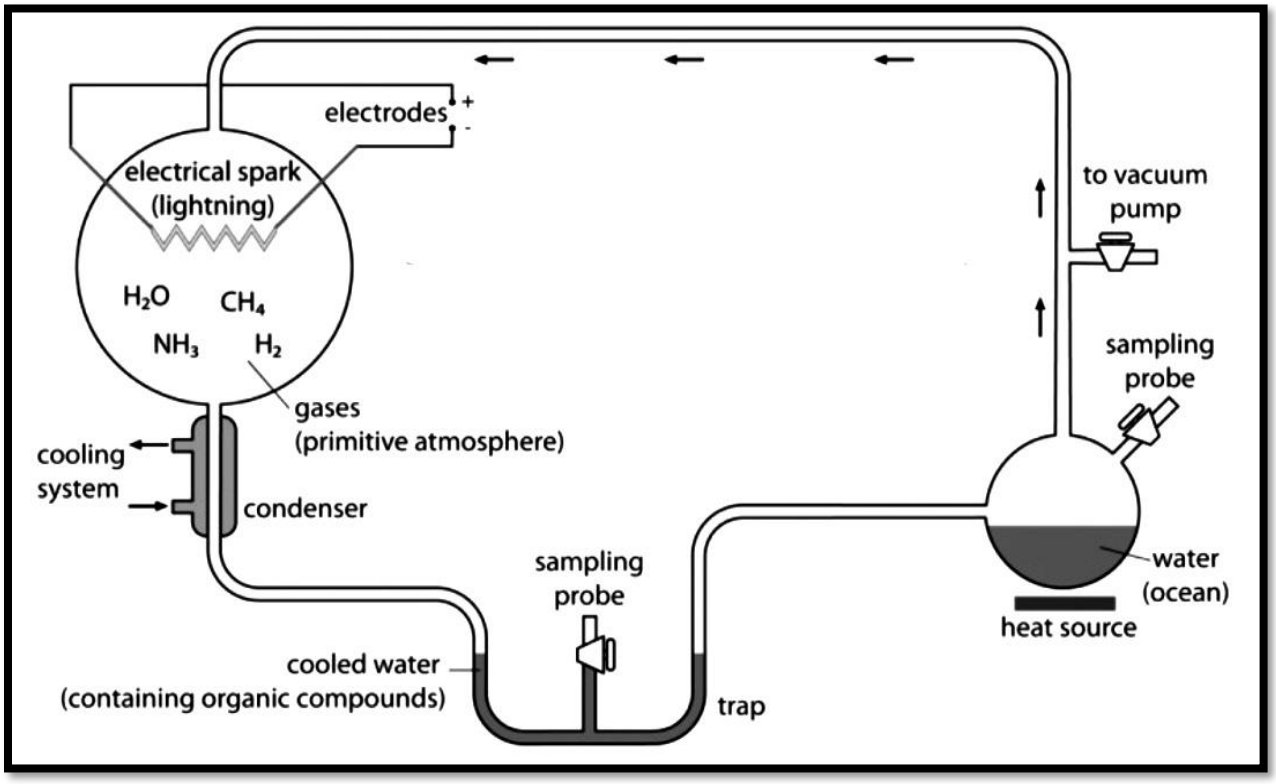
[10]

QUESTION 2

The experiment conducted by two chemists Miller and Urey in 1953 is the classic experiment on the origin of life on earth. It established that the early earth's atmosphere was capable of producing amino acids, the building blocks of life, from inorganic substances. Scientists have also suggested that lightning played a crucial role in the origin of life on Earth.

In Miller-Urey experiment, water was added to a boiling flask. Then the apparatus was evacuated completely of air since it is believed that the primitive atmosphere did not have oxygen gas. Once the air had been removed, the four gases believed to have been present in the pre-biotic atmosphere of the earth, were pumped into the apparatus. The water in the flask was boiled and an electrical discharge was introduced into the flask.

Study the set-up of the experiment below and answer the questions that follow.



2.1 Name the **TWO** scientists who carried out the experiment that proved the origin of life on earth. (2)

2.2 Why was all the air evacuated from the apparatus at the start of the experiment? (2)

2.3 Name the **FOUR** gases that were present in the atmosphere of the prehistoric earth that were used in the experiment above. (4)

2.4 State the significance of introducing an electrical spark in the experiment. (1)

2.5 Name the product of this experiment. (1)

[10]

QUESTION 3

In 2004 a Red Data Book of mammals in South Africa was produced and 295 mammal species of South Africa, both marine and terrestrial, were assessed to rate their risk of extinction. A 'Six Risk Level Criteria' was used to categorize the mammals.

The table below shows number of mammal species in **three risk levels** only.

RISK LEVEL	**NUMBER OF SPECIES**
Critically endangered	10
Endangered	18
Vulnerable	29

3.1 Identify the Risk Level with the **lowest number** of mammal species in the table. (1)

3.2 The table above shows only three Risk Levels out of the six that were in the Red Data Book.

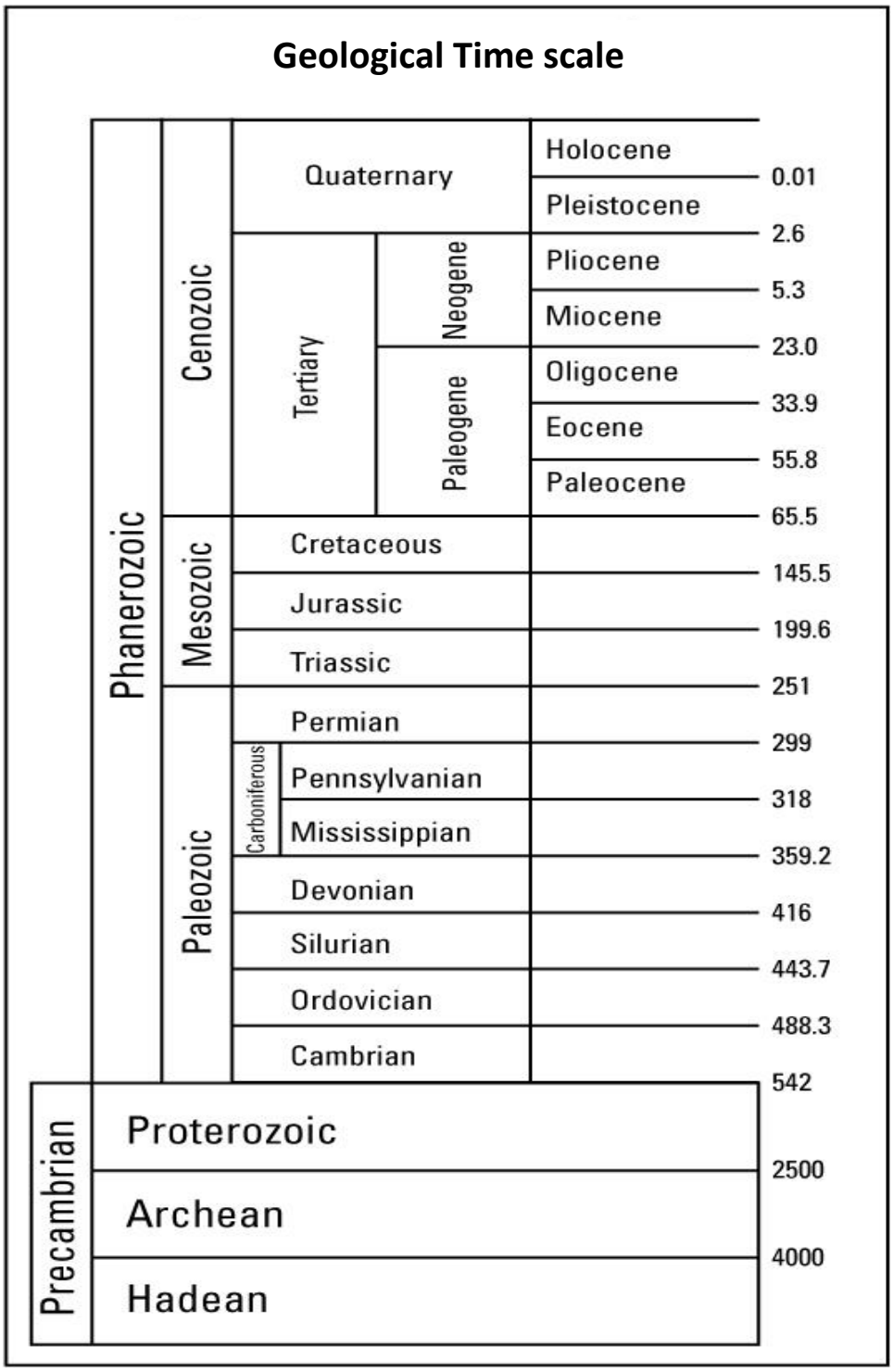
Calculate the **total number of mammal species** in the remaining Three Risk Levels which are not recorded. Show your working. (3)

3.3 Use the information in the table to plot a pie chart. (6)

[10]

QUESTION 4

A Geological Time Scale is a system for organizing the history of the Earth into units of time, from the smallest to the largest, based on the events and processes that happened. It covers a vast expanse of time, from the formation of the planet nearly 4600 million years ago to the present day. Study it and answer the questions that follow.



4.1 Name the Epoch in which humans currently live. (1)

4.2 Name the Eras in which the following are found:

(a) Eocene Epoch.

(b) Devonian Period.

(c) Triassic Period. (3)

4.3 Calculate how long the Cambrian period lasted. Show your working. (3)

4.4 When did the Permian period begin and when did it end? (2)

4.5 The extinction of dinosaurs occurred about 65.5 MYA. Name the Era that followed soon after the dinosaurs became extinct. (1)

[10]

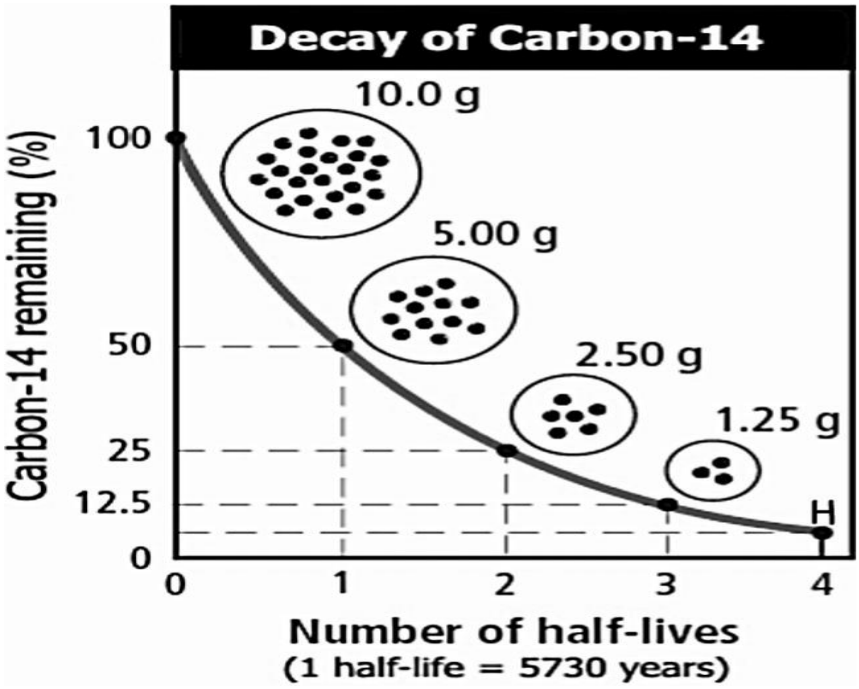
QUESTION 5

Radiometric dating using Carbon-14.

Living organisms like plants and animals absorb Carbon-14 into their tissue. When they die, Carbon-14 starts to change into other atoms over time.

Carbon-14 has a half-life of 5730 years. This means that half the amount of Carbon-14 in the dead organism will change to other atoms in that amount of time.

By calculating the amount of Carbon-14 still left in a fossil and calculating how much has been changed to other atoms, scientists are able to calculate the age of fossils.



5.1.1 State the number of half-lives of Carbon-14 indicated in the graph. (1)

5.1.2 Give the percentage of Carbon-14 present in a fossil at point H. (1)

5.1.3 Identify the dependent variable. (1)

5.1.4 State the relationship between the number of half-lives and the percentage of Carbon-14 of a fossil. (2)

5.2 Use the table below on Carbon-14 decay to answer questions 5.2.1 and 5.2.2.

Half-Life	**Mass of Carbon-14 (grams)**	**Fraction of the original amount of Carbon-14 remaining.**	**Number of years**
0	200	1	0
1	100	1/2	5730
2	50	1/4	11460
3	25	1/8	17190
4	12.5	1/16	**X**
5	6.25	1/32	28650
6	**W**	1/64	**Y**

5.2.1 Write down the values of

i) **W**

ii) **X**

iii) **Y**. (3)

5.2.2 Explain why the amount of Carbon-14 left in the fossil cannot be used for dating fossils older than 60 000 years. (2)

[10]

TOTAL MARKS: 50