

# Hillcrest High

## LIFE SCIENCE - PAPER 2

Grade 10

NOVEMBER 2023

**MARKS:** 150

**EXAMINER:** Mrs L. Prior

**TIME:** 2 ½ Hours

**MODERATOR:** Mrs R. Harmse

***N.B. This question paper consists of 3 Questions and 14 Pages.***

**INSTRUCTIONS TO CANDIDATES**

**READ THESE INSTRUCTIONS CAREFULLY BEFORE ANSWERING THE QUESTIONS.**

1. Answer **ALL** the questions in the answer booklet provided.
2. Number the questions exactly as the questions are numbered.
3. Write neatly and legibly.
4. All drawings should be done in pencil and labelled in ink.
5. Use **ONLY** blue or black ink.
6. Non-programmable calculators, protractors and compasses may be used.

## SECTION A:

### QUESTION ONE:

1.1. Various possible options are provided as answers to the following questions/statements. Choose the correct answer and write **ONLY** the letter (A – D) next to the question number (1.1.1 – 1.1.10) in the answer book.

1.1.1. The structure that prevents mixing of oxygenated and deoxygenated blood in the heart.

- A. tricuspid valve
- B. semi-lunar valve
- C. cardiac septum
- D. bicuspid valve

1.1.2. The blood vessel that carries deoxygenated blood.

- A. aorta
- B. pulmonary artery
- C. coronary artery
- D. pulmonary vein

1.1.3. All the lions in an area would be an example of a/an ...

- A. ecosystem
- B. community
- C. biosphere
- D. population

1.1.4. Which of the following is correct about the coelacanth?

- A. It is an amphibian
- B. It is extinct
- C. It is a living fossil
- D. Scientists have never found a living coelacanth

1.1.5. Organisms that live in water are called ...

- A. terrestrial
- B. xerophytes
- C. buoyant
- D. aquatic

1.1.6. The element nitrogen is taken into plants in the form of ...

- A. nitrogen gas
- B. ammonium salts
- C. nitrates
- D. proteins

1.1.7. The second word in the binomial system represents the ...

- A. genus
- B. species
- C. kingdom
- D. family

1.1.8. Which of the following is NOT a physiographic factor?

- A. Temperature
- B. Slope
- C. Aspect
- D. Altitude

1.1.9. When more than 50% of the Earth's species vanish in the geological instant of a few million years.

- A. Extinction
- B. Mass extinction
- C. Natural extinction
- D. Global death

1.1.10. Which of the following is a characteristic of Kingdom Animalia?

- A. Contains cell walls.
- B. Autotrophic.
- C. Saprophytic.
- D. Multicellular.

10 x 2 =(20)

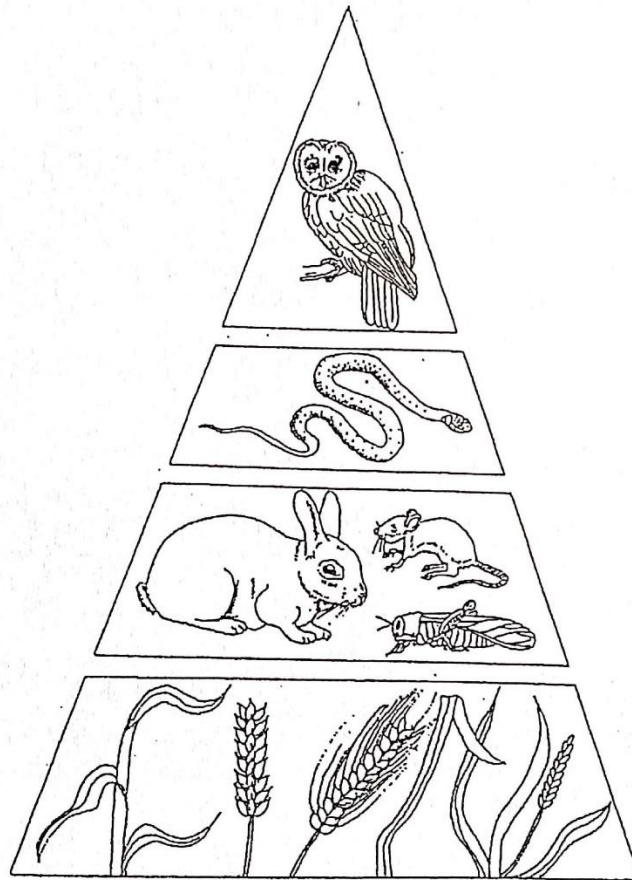
- 1.2. Give the correct biological term for each of the following descriptions. Write **ONLY** the term next to the question number (1.2.1 – 1.2.10).
- 1.2.1. Method used to determine the age of a fossil based on the natural decay of carbon.
  - 1.2.2. The formation of large sheets of ice in nature.
  - 1.2.3. The kingdom to which ferns and mosses belong.
  - 1.2.4. The period of the cardiac cycle when the atria and ventricles are contracting.
  - 1.2.5. The double membrane surrounding the heart.
  - 1.2.6. The movement of large masses of land over millions of years.
  - 1.2.7. An organism that lacks a true nucleus,
  - 1.2.8. Organism made of one cell only.
  - 1.2.9. The type of soil that is good for plant growth.
  - 1.2.10. The part of the earth that consists of soil and rocks. **(10)**

- 1.3. State whether for each of the phrases in COLUMN I, applies to **A only**, **B only**, **BOTH A and B** or **NONE** in COLUMN II.

COLUMN I	COLUMN II
1.3.1. Plants requiring small quantities of water.	A. Mesophytes
	B. Xerophytes
1.3.2. Organism in a food chain that receives the most energy.	A. decomposer
	B. consumer
1.3.3. The height above sea level.	A. Altitude
	B. Aspect
1.3.4. A footprint of an extinct animal is known as...	A. exposed fossil
	B. trace fossil
1.3.5. Carries blood to the heart.	A. Arteries
	B. Veins

**5x2 = (10)**

1.4. Study the diagram below and answer the questions that follow.



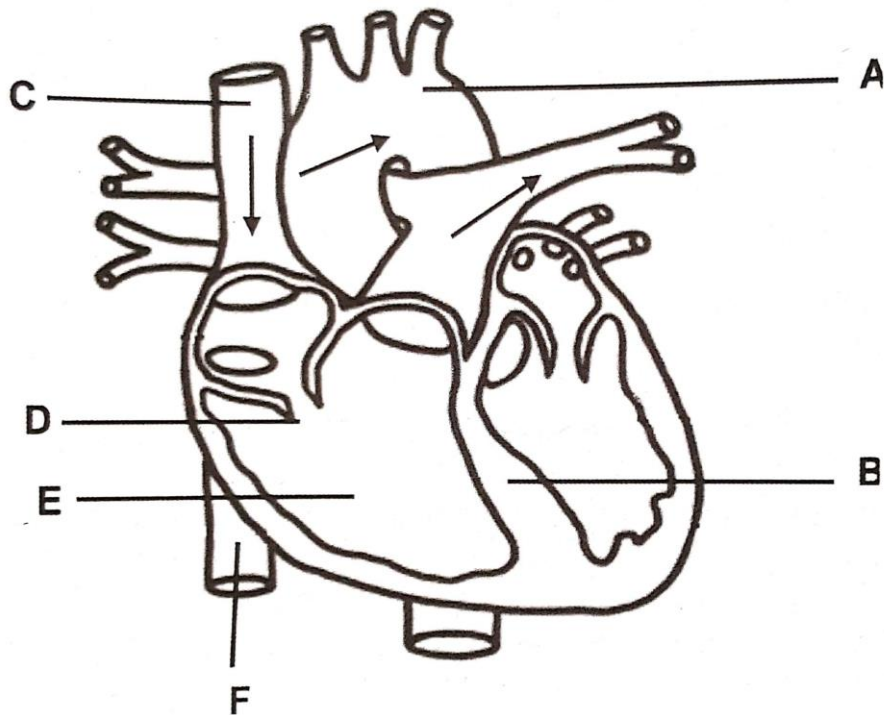
- 1.4.1. What does this diagram represent? (1)
- 1.4.2. How many trophic levels are there? (1)
- 1.4.3. Name the organism that is a:
- a) Tertiary consumer (1)
  - b) Producer (1)
  - c) Herbivore (1)
- 1.4.4. Use the diagram above to draw **ONE** food chain. (3)
- 1.4.5. If a farmer used a pesticide on his crops to kill all the insects, what effect would this have on the other organisms shown in the diagram. (2)
- (10)**

**TOTAL SECTION A : 50**

## SECTION B:

### QUESTION TWO:

2.1. The diagram below shows the human heart.



2.1.1. Identify the parts of the heart labelled **A**, **E** and **F**. (3)

2.1.2. Give the **LETTER** and the **NAME** of the part that:

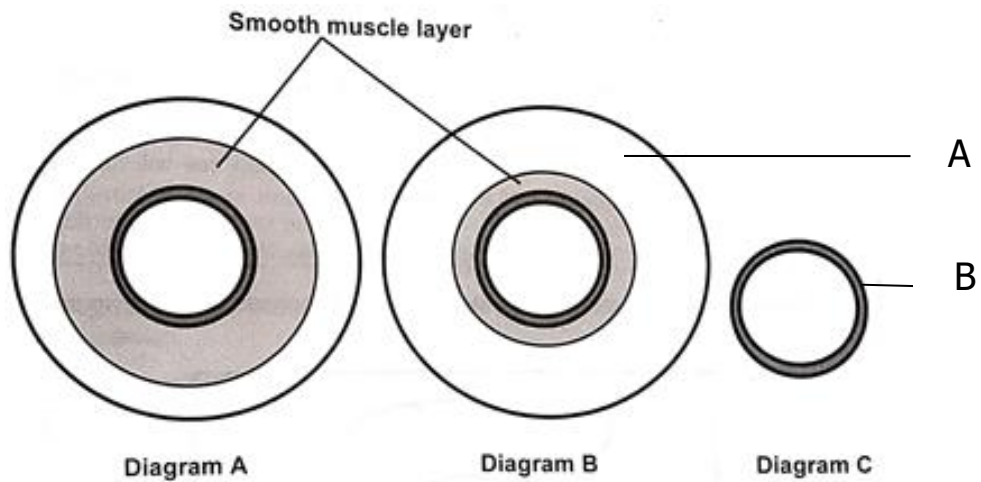
a) Returns blood from the upper part of the body to the heart. (2)

b) Prevents blood from flowing back into the right atrium. (2)

2.1.3. Describe fully the flow of blood during systemic circulation. (4)

**(11)**

2.2. Diagrams **A**, **B** and **C** below represent three types of blood vessels.



2.2.1. Identify the type of blood vessel in:

- a) Diagram **B** (1)
- b) Diagram **C** (1)

2.2.2. Explain why the blood vessel in Diagram **A** has a thicker smooth muscle layer. (2)

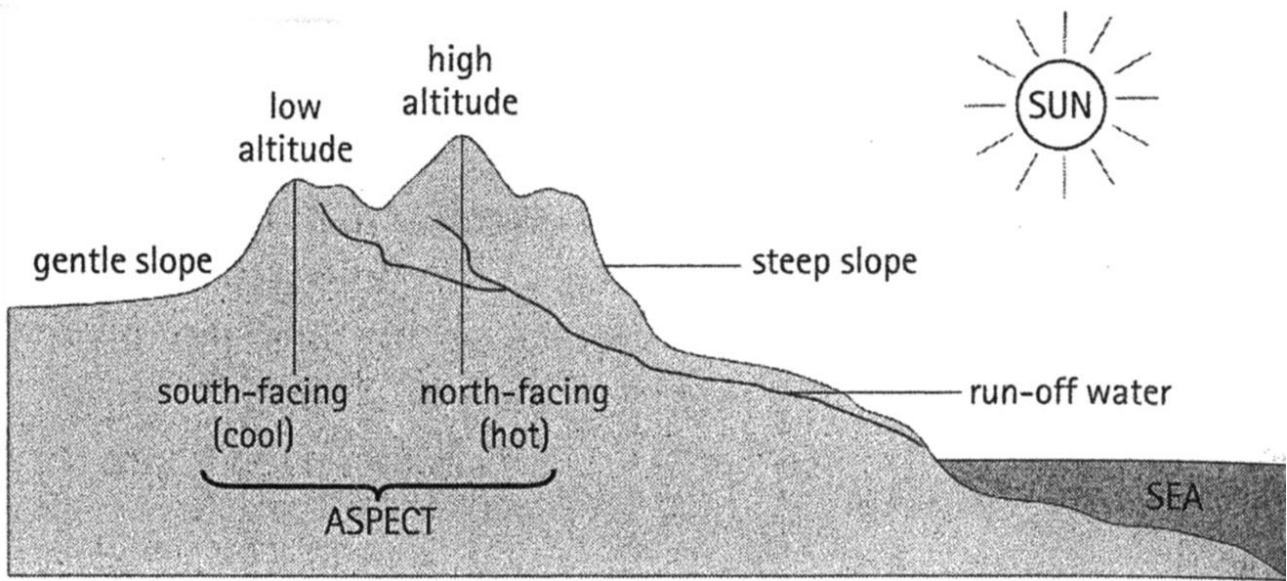
2.2.3. Identify the layers labelled **A** and **B**. (2)

2.2.4. Name any **TWO** blood cells that are transported within blood vessels. (2)

2.2.5. Tabulate **TWO** differences between Diagram **A** and Diagram **B**. (5)

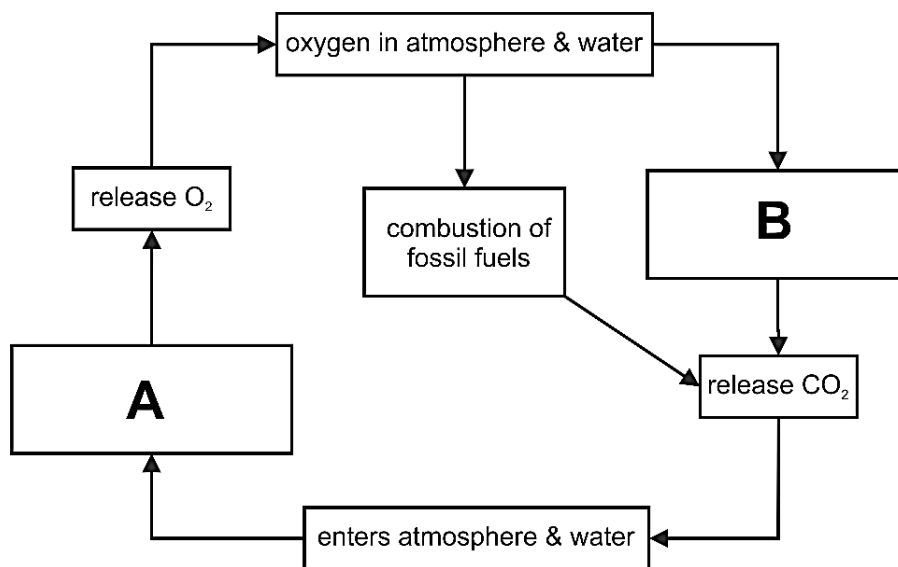
**(13)**

2.3. Study the figure below and answer the questions set.



- 2.3.1. Discuss **ONE** way in which high altitudes affects the composition of air. (2)
  - 2.3.2. Will the north-facing or south-facing slope support a larger plant life? Give a reason for your answer. (2)
  - 2.3.3. Which slope will have more animals present? (1)
  - 2.3.4. State **ONE** negative effect of a steep slope. (1)
- (6)**

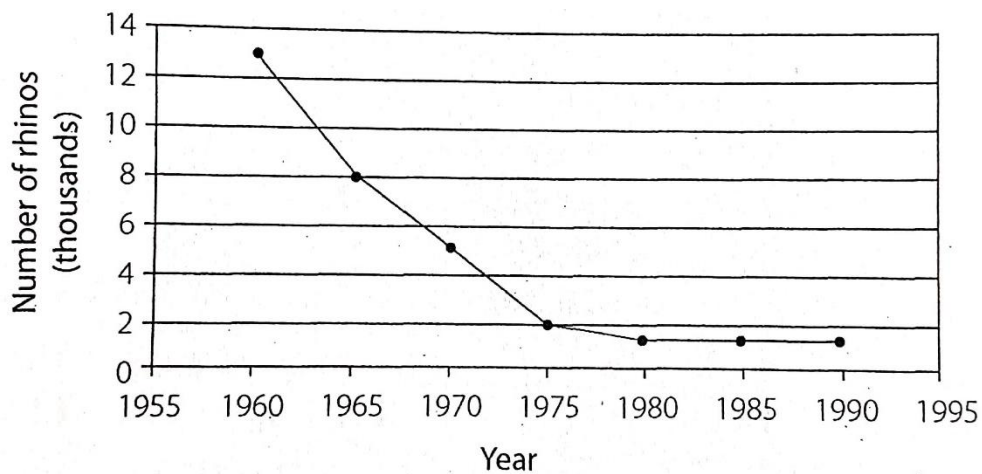
2.4. Study the diagram of a nutrient cycle below and then answer the questions.



- 2.4.1. Name the nutrient cycle shown in the diagram above. (1)
- 2.4.2. Name the processes occurring at **A** and **B**. (2)
- 2.4.3. Describe the negative effect high levels of carbon dioxide would have in the atmosphere. (2)
- 2.4.4. Define the term combustion. (1)
- (6)**

2.5. The graph below provides information about the number of black rhino in a country over a period of 30 years.

Line graph showing the number of black rhino from 1960.

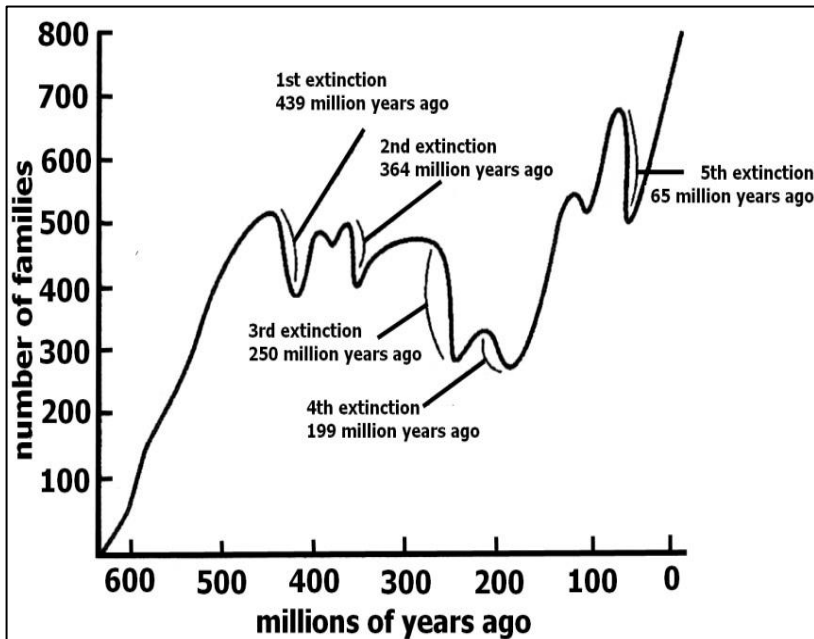


- 2.5.1.. Define the term species. (2)
- 2.5.2. The scientific name for the black rhino is *diceros bicornus*. Rewrite this name using the correct scientific format. (3)
- 2.5.3. Calculate the decrease in the rhino population from 1960 to 1975. Show ALL your calculations. (3)
- 2.5.4. State **ONE** reason for the sharp decline in the population numbers of black rhino from 1960 to 1975. (1)
- 2.5.5. Suggest **THREE** actions taken by government that caused the black rhino population to remain stable from 1980 to 1990. (3)
- 2.5.6. Explain how the decrease in rhino numbers has affected their genetic diversity. (2)
- (14)**

**Question 2 = 50**

**QUESTION THREE:**

3.1. Study the graph and table below and then answer the questions that follow.



ERA	PERIOD
CENOZOIC	Miocene
	Oligocene
	Eocene
	Paleocene
MESOZOIC	Cretaceous
	Jurassic
	Triassic
PALEOZOIC	Permian
	Carboniferous
	Devonian
	Silurian
	Ordovician
	Cambrian
PRECAMBRIAN	

Millions of years ago

- 3.1.1. Which era had the longest duration? (1)
  - 3.1.2. Which was the shortest period in the Mesozoic era? (1)
  - 3.1.3. During which period did the planet first reach 500 families of species? (2)
  - 3.1.4. Approximately how many families of species died out at the Second Mass Extinction?  
Show all working. (3)
  - 3.1.5. Name and describe **ONE** theory of mass extinction that could account for the Fifth Mass Extinction. (3)
- (10)**

3.2. Read the following two adapted extracts, taken from the Maropeng website (www.maropeng.co.za) and answer the questions that follow.

**Extract 1:**

**Why visit the Cradle of Humankind?**

The Cradle of Humankind was declared a World Heritage Site in 1999 because of the area's exceptional contribution to our understanding of the history of humanity, over more than 3 million years. All together, there are 15 major fossil sites in the Cradle of Humankind, of which Sterkfontein Caves is the most famous. The fossils 'Mrs Ples' and 'Little Foot' were both discovered at the Sterkfontein Caves, as well as thousands more fossils of hominids, which are human ancestors, and those of plants and animals.

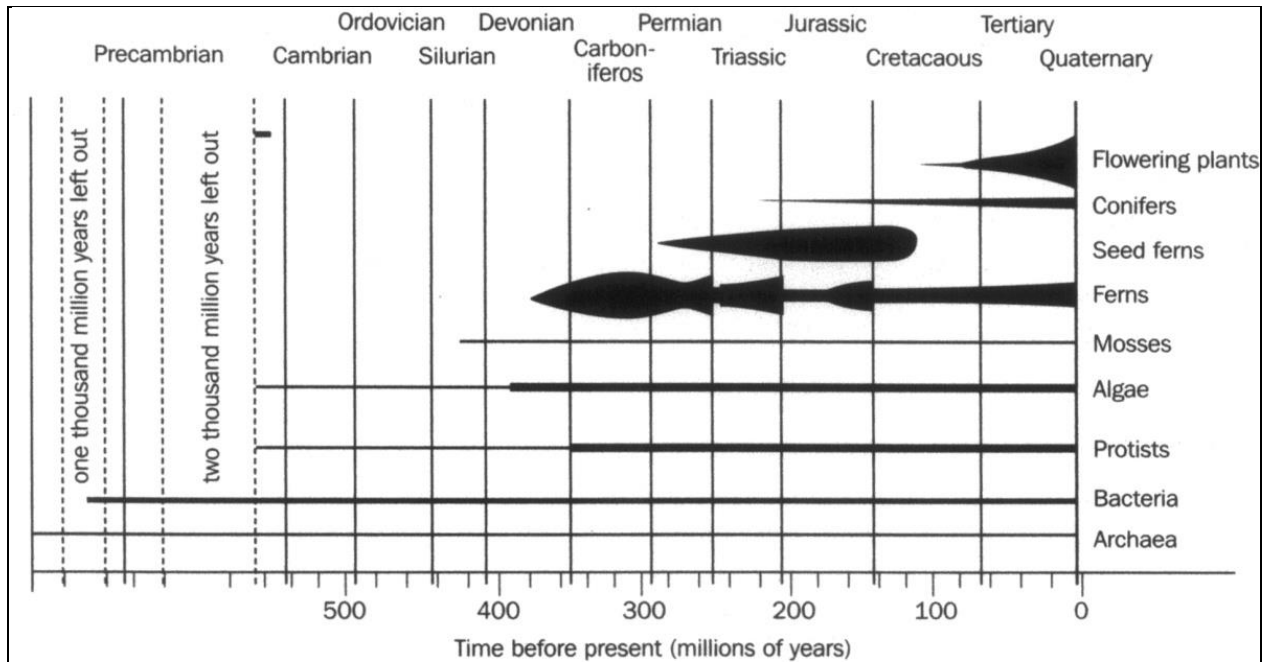
**Extract 2:**

Web technology is playing an integral role in the unfolding story of the latest fossil find *Australopithecus sediba*. Using *Google Earth* helped Prof. Lee Berger (a leading palaeontologist from the University of Witwatersrand and the man behind the exciting new fossils currently on display at Maropeng) discover them. Fossil experts and members of the public around the world continue to debate the merits of this find.

A debate is raging in cyberspace over whether the recently unveiled fossils found by Berger, which he claims constitute a new species of hominid, are in fact those of transitional species between *Australopithecus* and *Homo*.

- 3.2.1. What is meant by a 'World Heritage Site'? (2)
- 3.2.2. Why is it important to protect fossils? (2)
- 3.2.3. What does a palaeontologist study? (1)
- 3.2.4. Write down an example, from the above extract of:
- a) a genus (1)
  - b) a species (1)
- 3.2.5. Why are there often debates between palaeontologists about where a fossil should be positioned in a fossil record? (2)
- 3.2.6. Name **TWO** ecotourist sites that are mentioned in the extract above. (2)
- 3.2.7. Define what is meant by a transitional species. (2)
- (13)**

3.3. The diagram below shows the approximate change in the number of species of some groups during the history of life.



- 3.3.1. a) Name the group of plants that has existed for the least amount of time. (1)
- b) Estimate the number of years they have existed. (2)
- 3.3.2. The seed ferns did not last very long.  
Name the period in which they became extinct. (1)
- 3.3.3. From the diagram above, give evidence that the ferns have been a successful group of plants. (2)
- 3.3.4. At the end of Jurassic period, which group of plants had the most species? (1)
- 3.3.5. Suggest **ONE** reason why you think the bacteria group has survived for the longest period of time. (2)
- (9)**

3.4. The table below shows the results of an experiment which investigated the effect of light and temperature on the growth of hothouse cucumbers. The growth of the cucumbers is measured by the yield of cucumbers produced by the plants.

(Yield = mass of cucumbers in kilograms).

Day Temperature (°C)	Low light level. Yield per plant (kg)	High light level. Yield per plant (kg)
10	0.7	0.7
15	1.4	1.6
18	3.6	5.2
20	3.9	8.9
24	4.0	7.8
28	2.8	6.4
30	2.6	6.2

3.4.1. State a hypothesis for this experiment. (2)

3.4.2. Identify the dependent variable. (1)

3.4.3. Name **TWO** other variables that would need to be kept constant for this to be a fair test. (2)

3.4.4. Draw a **LINE GRAPH** showing the results of the effect of temperature on the yield per plant in kilograms for both low light and high light levels on the same set of axes. (5)

3.4.5. Write down a suitable conclusion from this experiment about the influence of light and temperature in the growth of cucumbers. (2)  
(12)

3.5. You have studied Edaphic Factors. State what the study is about and explain how **THREE** factors you have studied affect plant growth. (6)

**Question 3 = 50**

**TOTAL SECTION B : 100**