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education

Department of Education
FREE STATE PROVINCE

GRADE 10

LIFE SCIENCES P2

NOVEMBER 2024

MARKS: 150

TIME: 2½ HOURS

This question paper consists of 17 pages.

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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK.
3. Start the answers to 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. Make ALL drawings in pencil and label them in blue or black ink.
7. Draw diagrams, tables or flow charts only when asked to do so.
8. The diagrams in this question paper are NOT necessarily drawn to scale.
9. Do NOT use graph paper.
10. You must use a non-programmable calculator, protractor and compass, where necessary.
11. Write neatly and legibly.

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SECTION A

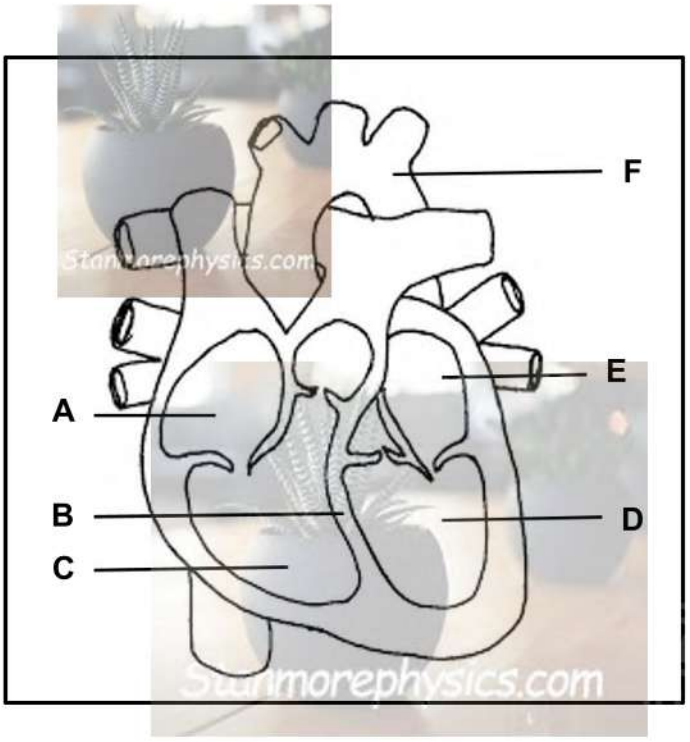
QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A to D) next to the question numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, for example, 1.1.11 D.

1.1.1 A population is made up of …

A individuals of the same species.
B communities.
C ecosystems.
D different species.

QUESTIONS 1.1.2 AND 1.1.3 ARE BASED ON THE DIAGRAM BELOW OF A HUMAN HEART



1.1.2 The letter of the part of the heart that prevents the oxygenated and deoxygenated blood in the heart from mixing is…

A A
B B
C D
D E

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1.1.3 Which one of the following does **NOT** form part of the systemic circulation?

A Right atrium
B Aorta
C Left lung
D Vena cava

1.1.4 Identify the correct way of writing the biological name of the African lion.

A panthera Leo
B *Panthera Leo*
C Panthera leo
D *Panthera leo*

1.1.5 The part of the Earth where organisms live is called the …

A atmosphere.
B lithosphere.
C biosphere.
D hydrosphere.

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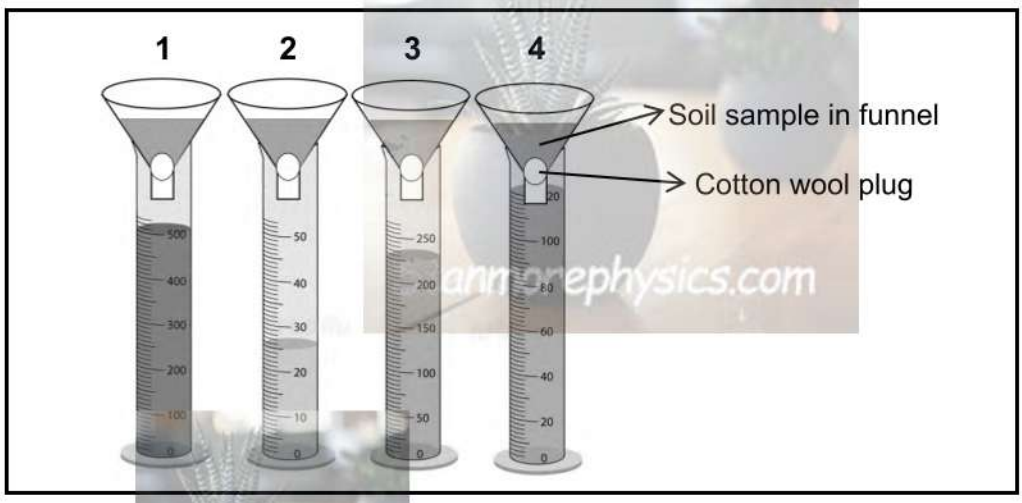
QUESTIONS 1.1.6 AND 1.1.7 ARE BASED ON THE EXPERIMENT BELOW.

1.1.6 Cotton wool plugs are placed in glass funnels and equal amounts of different soil samples are placed in the funnels. Then equal volumes of water are poured into the funnels.



The correct aim of this experiment is:

A To determine the pH of different soil types
B To determine the oxygen levels of different soil types
C The influence of different soil types on water retention
D To determine the texture of different soil types

1.1.7 Which funnel contains clay soil?

A 1
B 2
C 3
D 4

1.1.8 Proteas are common to which biome?

A Forest
B Savannah
C Fynbos
D Grasslands

1.1.9 The terrestrial biome where water is the most limiting factor.

A Fynbos
B Wetlands
C Forest
D Succulent Karoo

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1.1.10 A person who studies fossils is known as a…

A archaeologist.
B palaeontologist.
C anthropologist.
D radiologist.

(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 numbers (1.2.1 to 1.2.10) in the ANSWER BOOK.

1.2.1 The transfer of energy from the sun, though green plants and various consumers

1.2.2 The membrane that surrounds the heart

1.2.3 An organism that is specifically restricted to a region

1.2.4 Movement of water between the ocean, atmosphere, and land

1.2.5 Variety of living organisms on earth

1.2.6 The structure that ensures flow of blood in one direction only

1.2.7 The remains of organisms that have been preserved in rock

1.2.8 The cardiac valve that occurs at the base of the aorta and pulmonary artery

1.2.9 The non-living components of an ecosystem

1.2.10 The trophic level on which primary consumers occur

(10 x 1) **(10)**

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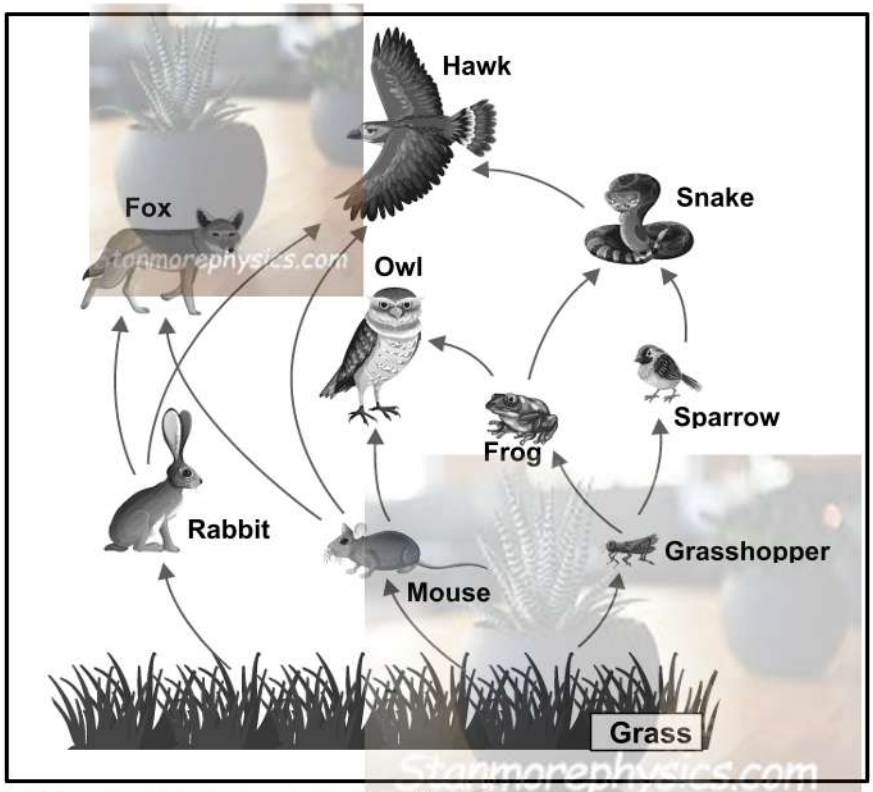
1.3 Indicate whether each of the descriptions in COLUMN I applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **both A and B** or **none,** next to the question numbers (1.3.1 to 1.3.3) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	Organism that cannot produce their own food	A: Heterotrophic B: Predators
1.3.2	Transports oxygenated blood from the lungs to the heart	A: Pulmonary artery B: Pulmonary vein
1.3.3	Evidence of continental drift	A: Transitional fossil B: Biogeography

(3 x 2) **(6)**

1.4 The diagram below shows the feeding interaction in an ecosystem.



1.4.1 Identify what is represented by this diagram. (2)

1.4.2 What does the arrows in the diagram represent? (1)

1.4.3 Identify the producer in the diagram above. (1)

1.4.4 Give the NAME of ONE of the following:

(a) Carnivore (1)

(b) Secondary consumer (1)

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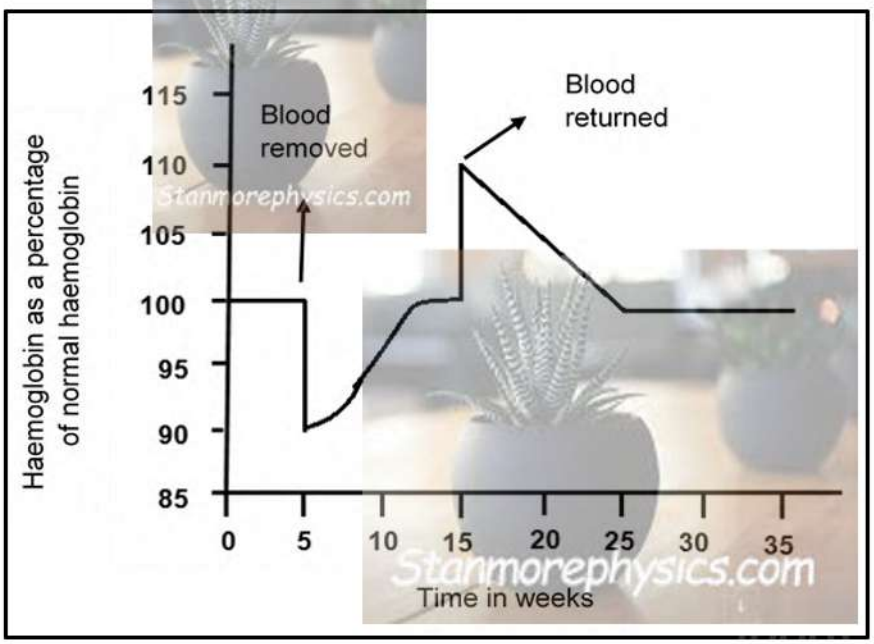
1.4.5 Name the group of organisms that break down dead organic matter in all ecosystems. (1)

1.4.6 Which group of organisms will have the largest total biomass? (1)
(8)

1.5 Blood doping is an illegal performance-enhancing practice primarily used by athletes to increase the haemoglobin content of their blood, which improves endurance and athletic performance.

During the Comrades Marathon of 2023, a runner had 500ml of his own blood removed, stored and returned to his body a few days before he competed in the marathon.

The graph below shows the haemoglobin content of the blood in the athlete's body over a period of 35 weeks.



1.5.1 Give the function of haemoglobin in the blood (1)

1.5.2 How long did it take for the athlete's haemoglobin levels to get back to normal after the blood had been returned? (2)

1.5.3 Calculate the difference in percentage haemoglobin in the athlete's blood from the time the blood was removed at 5 weeks to when the blood was returned at 15 weeks. (3)

(6)

Total Section A [50]

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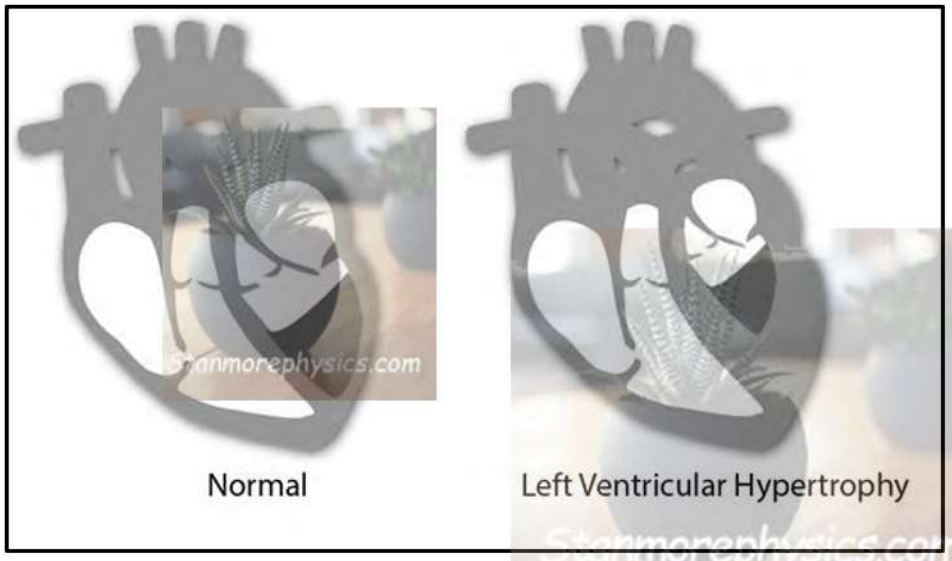
SECTION B
QUESTION 2

2.1 Left ventricular hypertrophy (LVH) is a condition in which the left ventricle, the heart's main pumping chamber, thickens and enlarges. This thickening is usually a response to increased workload on the heart, most commonly caused by high blood pressure (hypertension).

In normal conditions, the heart muscle can relax and contract with each heartbeat. In LVH, the heart muscle thickens, reducing its ability to relax and contract. This condition can eventually lead to heart failure.

Below is a representation of a normal heart and a heart affected by LVH:



2.1.1 Name the artery that exits the left ventricle of the heart. (1)

2.1.2 Name the phase in the cardiac cycle when (1)

2.1.3 Describe the flow of blood in the phase named in QUESTION 2.1.2. (6)

2.1.4 The left ventricle of a normal heart pumps blood at higher pressures than the rest of the heart chambers.

Explain the reason for this. (2)

2.1.5 Explain what effect **LVH** will have on the rest of the body. (2)
(12)

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2.2 The decay of carbon-14 over time is a key indicator of the age of organic remains. This proses is call radiometric dating.

It reveals the time since death of organisms, provides historical timelines, and offers clues to environmental conditions of the past.

By studying this decay, scientists can reconstruct the history of life on Earth, the development of human civilizations, and the progression of natural processes like climate change.

The table below shows the decay of Carbon-14 over time.

DECAY OF CARBON-14					
Years from the present	0	5 730	11 480	17 190	22 920
Number of half-lives elapsed	0	1	2	3	4
Percentage of original Carbon-14 remaining	100	50	25	12.5	6.25

2.2.1 Name ONE other method used to determine the age of organic remains. (1)

2.2.2 According to the extract give TWO significances of determining the age of organic remains. (2)

2.2.3 Identify the percentage of original Carbon-14 remaining in a fossil of 11 480 years ago. (2)

2.2.4 Name THREE important events, other than fossil evidence, that scientist use, to make sense of the history of life on earth. (3)

2.2.5 Describe fossil formation. (7)
(15)

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2.3 The table below shows different Eras and Periods in a geological time scale.

MYA	ERA	Period	Events
1.8	**Cenozoic**	Quaternary	Evolution of humans
50		Tertiary	Mammals' diversity
100	**Mesozoic**	Cretaceous	Extinction of dinosaurs First primates First flowering plants
150		Jurassic	First birds Dinosaurs' diversity
200		Triassic	First mammals
250			
300	**Palaeozoic**	Permian	Major extortions Reptile diversity
350		Pennsylvanian	First reptiles Large insects
400		Mississippian	Sharks
450		Devonian	First amphibians Forests
500		Silurian	
550		Ordovician	First fishes
		Cambrian	X Rapid increase in diversity in number of species

2.3.1 What does MYA stand for in this geological time scale? (2)

2.3.2 Give:

(a) The era humans are living in (2)

(b) The period when the first fishes appear (2)

(c) One example of the type of animal that first appear in the Devonia period (2)

2.3.3. Identify how long ~~did~~ the Devonian period lasted. (2)

2.3.4 Name the major event that took place at **X** approximate 543 MYA. (2)

2.3.5 List THREE theories how scientist explain the mass extinction ~~in~~ during the Cretaceous period. (3)
(15)

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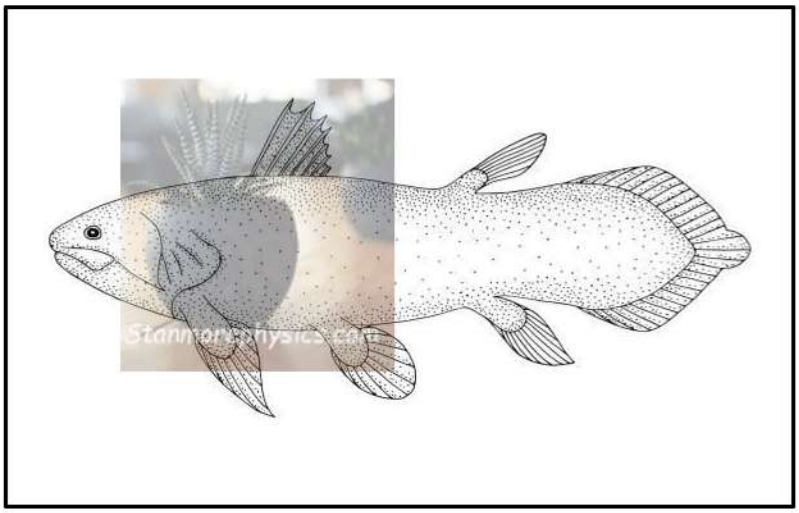
2.4 The coelacanth is an ancient fish that holds a special place in evolutionary history due to its "living fossil" status.

The unique characteristics of the coelacanth represent an early step in the evolution of fish to terrestrial four-legged animals like amphibians.

Coelacanths have several unique anatomical features, including lobed fins that resemble the structure of limbs, a bony skull, and a specialized hinge in their tail.

Once thought to be extinct for millions of years, it was rediscovered in 1938, off the mouth of the Chalumna River on the east coast of South Africa.



2.4.1 Where was the Coelacanth rediscovered? (1)

2.4.2 Explain what is meant by the term 'living fossil'. (2)

2.4.3 What is a fossil called that has characteristics of two different groups of organisms? (1)

2.4.4. Between which two groups of vertebrates does the coelacanth probably fit? (2)

2.4.5 Name TWO unique features of the Coelacanth. (2)
(8)

Total Question 2: (50)

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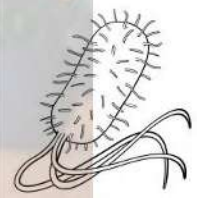
QUESTION 3

3.1 The diagram below shows organisms belonging to different kingdoms according to the Five-Kingdom system of classification.

A	B	C	D	E
				
Flowering plants	Bread mould	Insect	Amoeba sp.	Bacterium

3.1.1 Give The LETTER and KINGDOM of the organisms with the flowing characteristics:

(a) Autotrophic feeding method (2)

(b) Unicellular and prokaryotic (2)

(c) Have cell walls composed of chitin (2)

(d) Invertebrates and have no cell wall (2)

3.1.2 Tabulate TWO differences between prokaryotic and eukaryotic organisms. (5)
(13)

3.2. Carl Linnaeus designed a double-name system. The given name applies to one specie only. The system is based on Latin and is still being used today.

3.2.1 Give the name of the double-name system that Carl Linnaeus design. (1)

3.2.2 Explain why Carl Linnaeus use Latin as language to name the species. (2)
(3)

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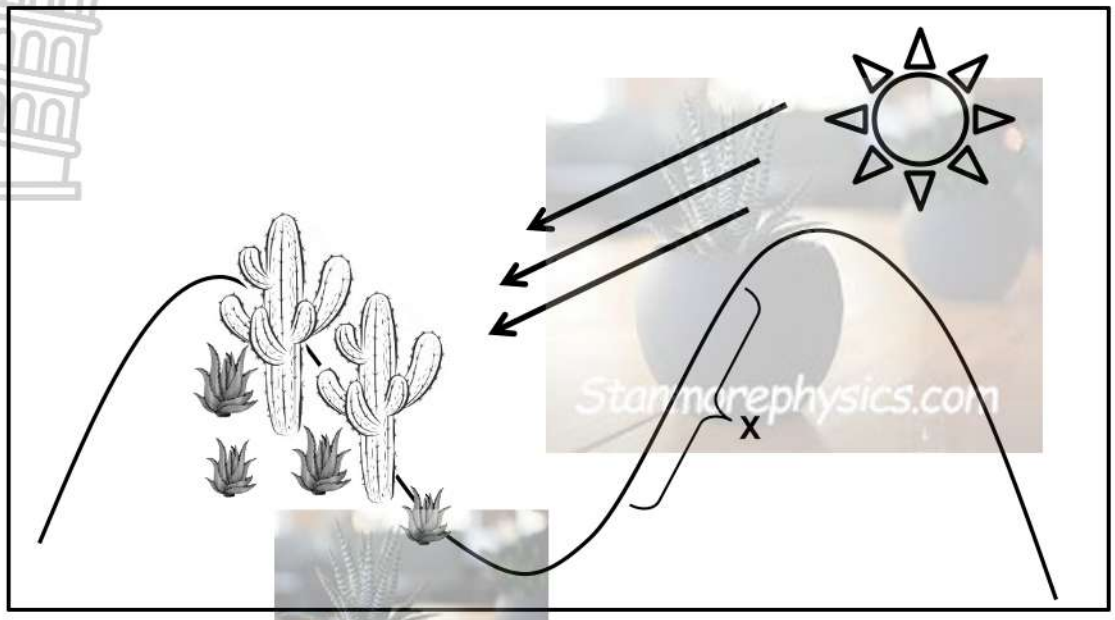
3.3 Succulent plants normally grow on rocky, north facing slopes as seen in the diagram below.



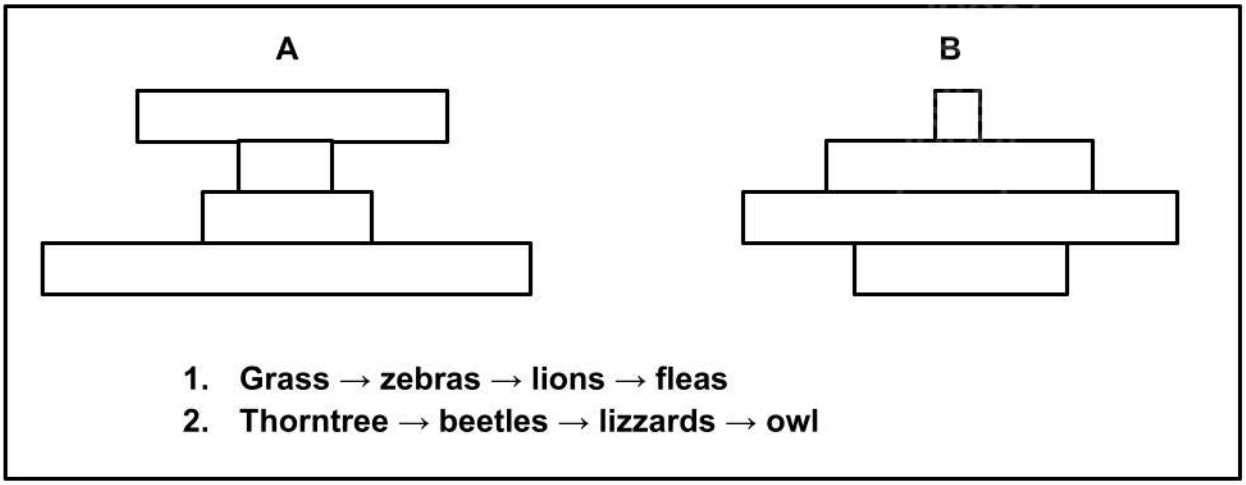
3.3.1 According to the water needs of succulent plants, are they **hydrophytes**, **mesophytes** or **xerophytes**? (1)

3.3.2 Give a reason for you answer to QUESTION 3.3.1 (1)

3.3.3 Name any TWO physiographic factors visible ~~from~~ in the diagram. (2)

3.3.4 Explain why there is no plant growth on area **X**. (2)
(6)

3.4 The diagram below shows two number pyramids labelled **A** and **B** and two food chains, labelled **1** and **2.**



1. **Grass → zebras → lions → fleas**
2. **Thorntree → beetles → lizzards → owl**

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3.4.1 Give the LETTER of the pyramid that match food chain **1**. (2)

3.4.2 The table below indicates data for food chain **2**.

ORGANISM	NUMBER	TOTAL MASS (g)
Thorntree	2	250 000
Beetles	50	250
Lizzards	10	115
Owl	1	90

Draw and label a bio-mass pyramid for food chain 2. (4)

3.4.3 Explain what will happen in food chain **1** during a severe drought. (3)
(9)

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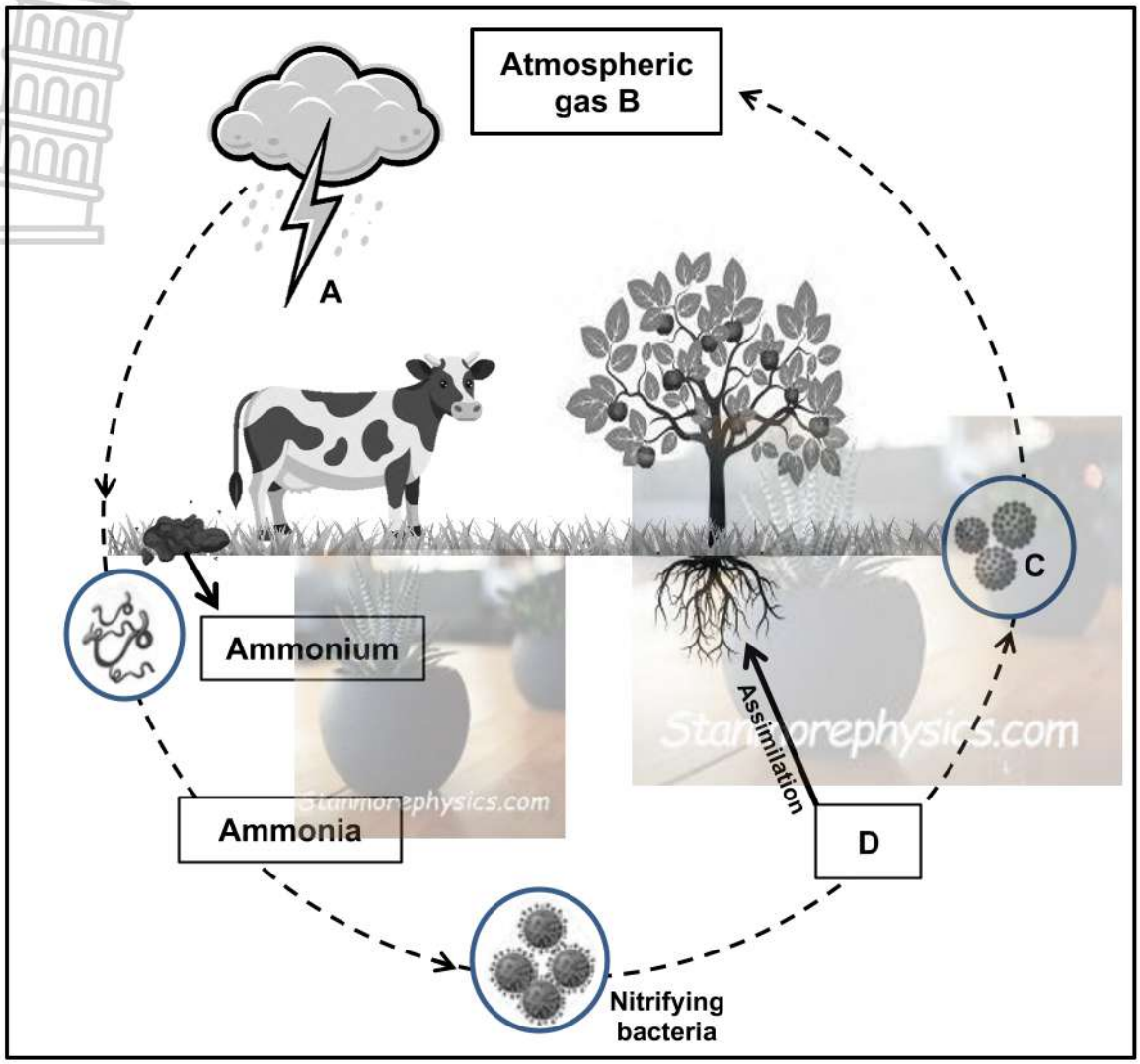
3.5 The diagram below shows a nutrient cycle.



3.5.1 Identify the following from the diagram:

(a) Natural phenomenon **A** (1)

(b) Gas **B** (1)

(c) Microorganism **C** (1)

(d) The element **D** that is absorbed by plants (1)

3.5.2 Explain the consequence to animals if the atmospheric gas **A** is removed from this cycle. (3)
(7)

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3. 6 Nathan and Nqaba heard that the Spekboom plant absorbs large amounts of CO_2 from the atmosphere, which helps prevent global warming. Plants need CO_2 for photosynthesis and to grow.

They decide to investigate the amount of CO_2 absorbed from different plants.

They bought three different types of plants from their local nursery with the same height, age and size: a Spekboom, an Aloe and a Prickly Pear.

All three plants were planted in equally sized pots with the same type and amount of soil. They were placed in the same location and received equal amounts of water.

Uptake of CO_2 can be measured with the means of an IRGA (Infra-Red Gas Analyser)

The results are shown in the table below:

Co_2 uptake in (g)			
Plant	**Start**	**End**	**Increase**
Aloe	800	832	32
Prickly Pear	800	843	43
Spekboom	800	871	71

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3.6.1 Identify the independent variable. (1)

3.6.2 Identify THREE ways that Nathan and Nqaba ensured the validity of their investigation. (3)

3.6.3 Write a conclusion from the results. (2)

3.6.4 Draw a bar graph to show the increase in CO_2 uptake of all three types of plants. (6)

(12)

[50]

TOTAL SECTION B: 100

GRAND TOTAL: 150

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