education
Department of Education
FREE STATE PROVINCE

GRADE 11

LIFE SCIENCES P2

NOVEMBER 2024

TOTAL: 150

TIME: 2 ½ HOURS

This question paper consists of 15 pages.

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 a compass, where necessary.
11. Write neatly and legibly.

SECTION A

QUESTION 1

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

1.1.1 Each species has a specific role to play in a community. This role is known as its …

A ecosystem
B ecology
C environment
D ecological niche

1.1.2 One of the key advantages of asexual reproduction is…

A offspring compete for food and space
B large numbers of offspring are reproduced quickly
C extreme temperature can wipe out entire colonies
D offspring are genetic clones

1.1.3 Sponges can best be described as …

A Aquatic, radial symmetric and sessile
B Aquatic, asymmetrical and sessile
C Occur everywhere, asymmetrical and free living
D Occur everywhere, radial symmetric and free living

1.1.4 Kittens competing for their mother's milk is an example of…

A Resource partitioning
B Interspecific competition
C Intraspecific competition
D Competitive exclusion

1.1.5 A protein that is made by the immune system that targets and combine with an antigen.

A Lymphocyte
B Phagocyte
C Antibody
D Vaccine

1.1.6 The micro-organism used in the manufacturing of beer

A Fungi
B Protista
C Bacteria
D Algae

1.1.7 Which of the following will have a negative impact on food security?

A Fertilizer
B Crop rotation
C Climate change
D Genetically modified organisms (GMO)

1.1.8 The phase in a growth form where population numbers reach the carrying capacity is the …

A lag phase
B equilibrium phase
C decelerating phase
D accelerating phase

1.1.9 The symbiotic relationship between two organisms of different species, where one benefits and the other neither benefits nor is harmed is…

A Mutualism
B Ectoparasite
C Endoparasite
D Commensalism

1.1.10 Which of the following can lead to habitat destruction?

I Mining
II Poor agricultural practices
III Reforestation
IV Urbanisation

A I, II and IV
B II, III and IV
C III
D I, II and III

(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 to 1.2.10) in the ANSWER BOOK.

1.2.1 Gas produced in landfill sites that has the potential to be used as biofuel

1.2.2 Root-like structures that absorb water and minerals in Bryophytes

1.2.3 A process caused by excessive nutrients in water which leads to algal bloom and reduces water quality

1.2.4 The collective name of a stigma, style and ovary of a flower

1.2.5 A group of organisms with similar characteristics, and in the same space and time that can reproduce

1.2.6 A collective name for animals without a backbone

1.2.7 Access to sufficient, safe and nutritious food

1.2.8 Growing of one type of crop over large areas of land, year after year

1.2.9 The layer that shields the earth from the damaging effects of the sun

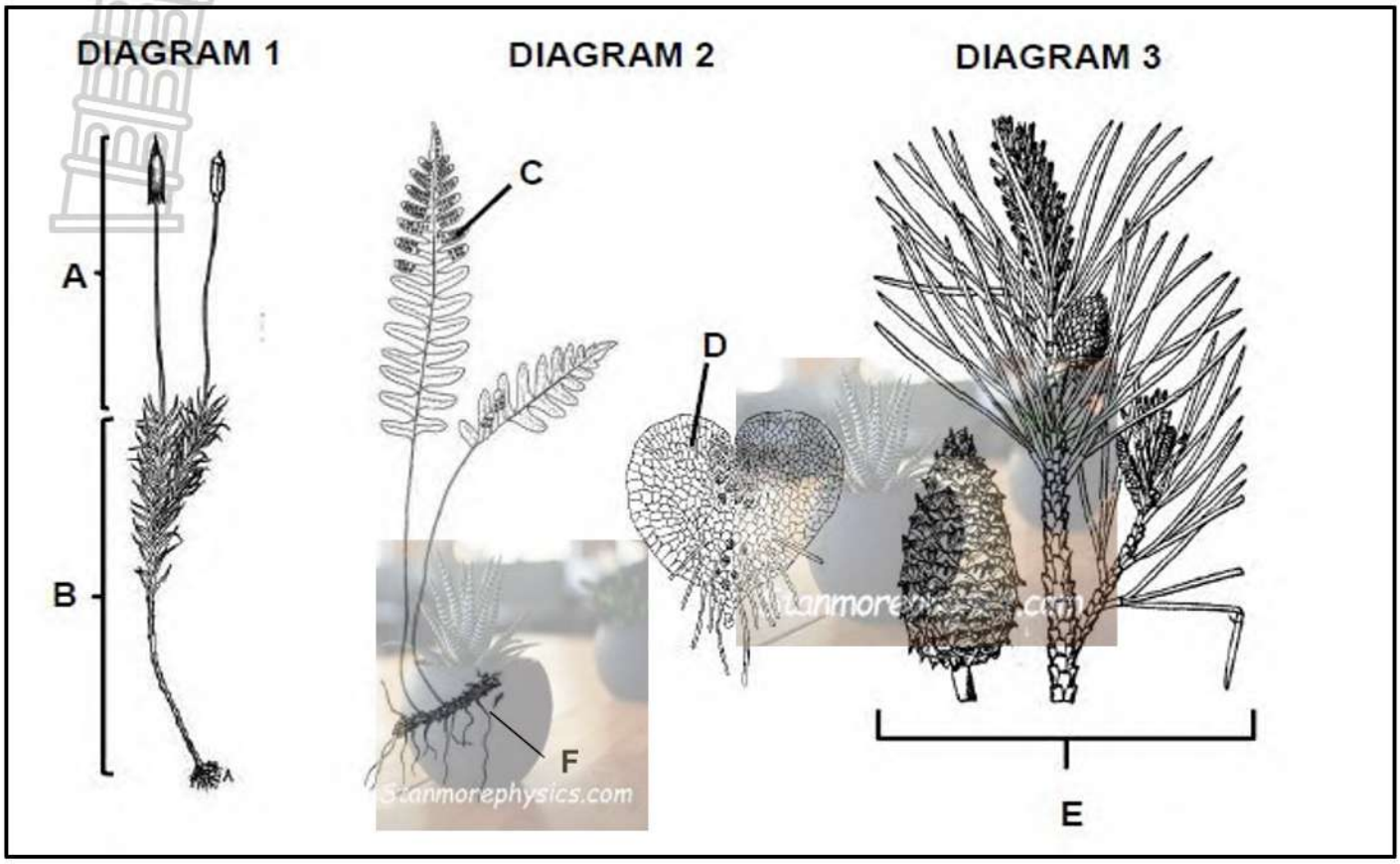
1.2.10 Medicinal substance that destroys pathogenic bacteria **(10)**

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 number (1.3.1 to 1.3.3) in the ANSWER BOOK.

COLUMN I		COLUMN II
1.3.1	Population growth form where population figures increase rapidly	A: Geometric growth form B: Logistic growth form
1.3.2	Total number of individuals in a population	A: Population density B: Population size
1.3.3	The death rate of a population	A: Census B: Mortality

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

1.4 The diagrams below represent different plant phyla.



1.4.1 Identify part:

a) **C** (1)

b) **F** (1)

1.4.2 Give the:

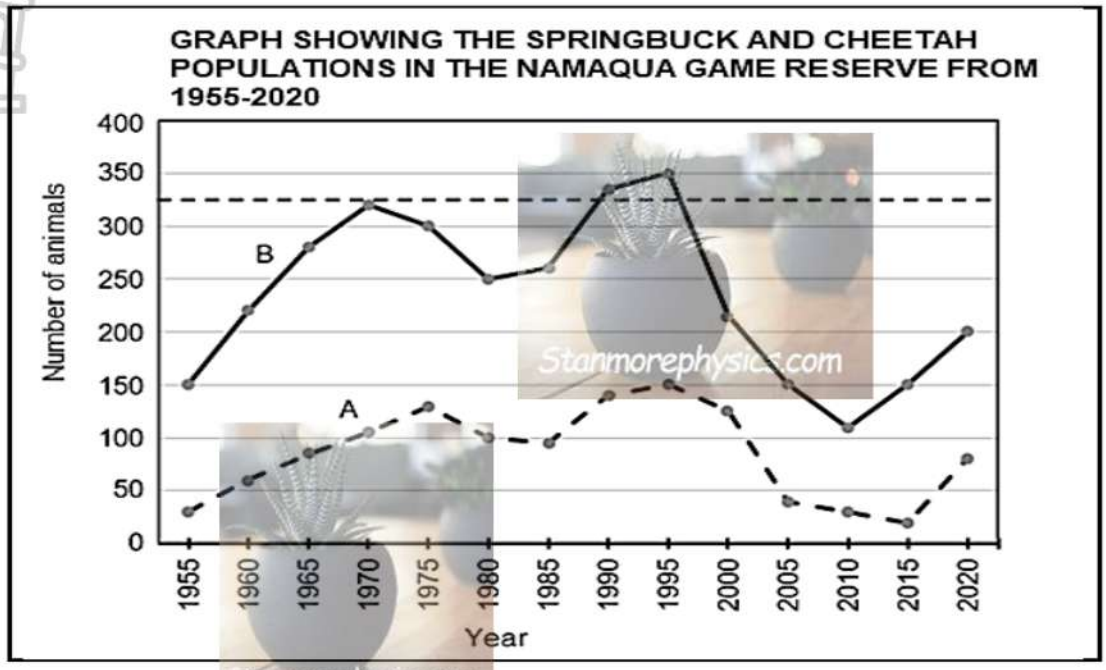
a) Phylum to which the organism in Diagram **2** belongs. (1)

b) LETTERS that represent the gametophyte generation. (2)

c) DIAGRAM NUMBERS of the groups that rely on water for reproduction. (2)

d) DIAGRAM NUMBER of the group that produces seed. (1)
(8)

1.5 The data in the graph below represents the number of springbuck and cheetah in the Namaqua Game Reserve over 65 years. The springbuck is the natural prey of cheetah. The natural carry capacity for springbuck in this reserve is 325. After this number was exceeded the management of the reserve decided to introduce a culling program.



1.5.1 Name this relationship between cheetahs and springbucks. (1)

1.5.2 Which line (**A** or **B**), represents the springbuck population? (1)

1.5.3 Between which years did the springbuck population exceed the carrying capacity? (2)

1.5.4 In which year was the culling programme introduced for springbuck, according to the graph? (1)

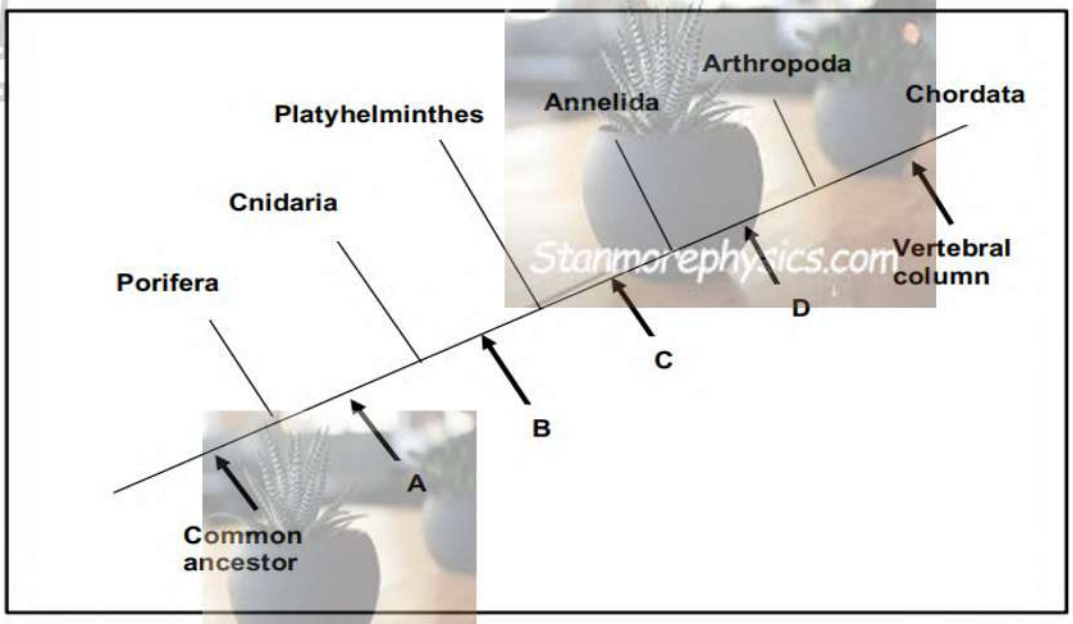
1.5.5 Name ONE other density dependant factor, besides predation, that could naturally reduce the springbuck population. (1)
(6)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The diagram below represents a phylogenetic tree (cladogram). The letters **A** to **D** indicate the characteristics which are shared by the different phyla



2.1.1 Give the definition of a *phylogenetic tree* . (2)

2.1.2 Study the following characteristics.

(i) Two openings in the gut and open blood system
(ii) Bilaterally symmetrical and triploblastic
(iii) Segmentation and coelom
(iv) Radially symmetrical and tissue level of organisation

Which characteristic **(i, ii, iii of iv)** appeared at the time represented by the following letters in the cladogram above?

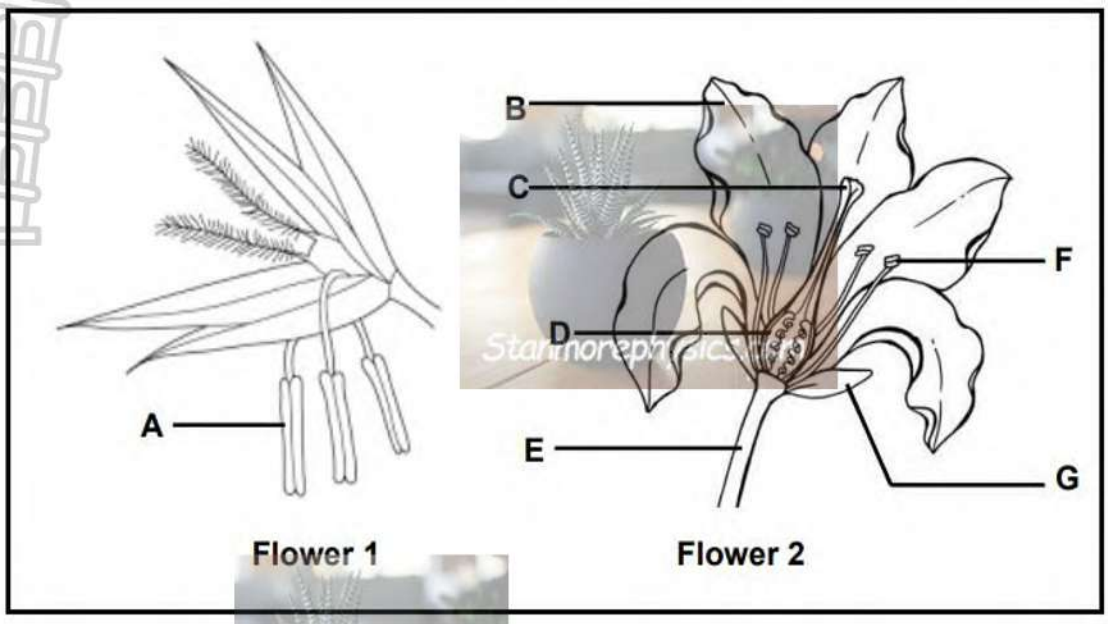
a) **A** (1)
b) **B** (1)
c) **C** (1)
d) **D** (1)

2.1.3 From the diagram above, state ONE characteristic that is not shared by the phyla Arthropoda and Chordata. (1)

2.1.4 Name the tissue layers of the phylum Cnidaria. (2)

2.1.5 Explain why the phylum platyhelminths is the first phylum to show cephalisation. (2)
(11)

2.2 The diagrams below represent two different flowers.



2.2.1 Name the plant group under which flowering plants are classified. (1)

2.2.2 Give the LETTER and NAME of the part that:

(a) Attracts insects (2)

(b) Develops into fruit after fertilization (2)

(c) Is sticky so that pollen grains can stick to it (2)

2.2.3 Which flower (**1** or **2**) above, is wind pollinated? (1)

2.2.4 Give THREE visible reasons for your answer in QUESTION 2.2.3. (3)

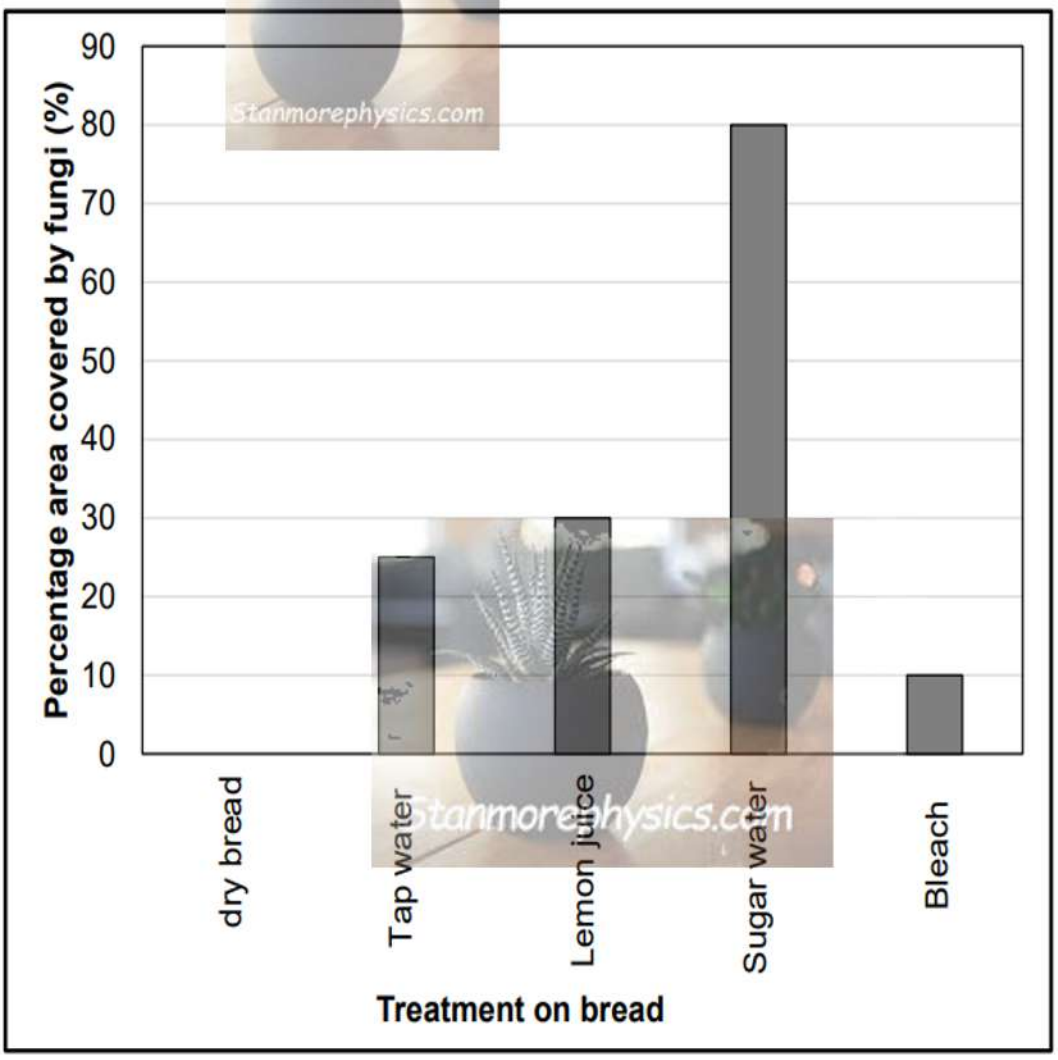
2.2.5 Explain why flowering plants reproduce sexually. (3)
(14)

2.3 Lerato conducted an investigation to determine how different treatments affect the number of fungi that grow on bread.

• She took five slices of bread and treated each in different ways as follows:

Slice 1: was left dry
Slice 2: added 20 mℓ tap water
Slice 3: added 20 mℓ lemon juice
Slice 4: added 20 mℓ sugar water
Slice 5: added 20 mℓ bleach (Jik)

• A spray bottle was used to apply the treatment to make sure that it was evenly spread on the bread.
• Each slice was placed in a Ziplock (Plastic) bag and kept in a cupboard for one week.
• After one week the bread was removed from the Ziplock bags and she observed the growth of the fungi.
• She calculated the percentage area of the bread covered by fungi.
• The results are shown in the graph below.



2.3.1 Name THREE favourable condition for the growth of fungi that Lerato had to take in consideration before conducting the investigation. (3)

2.3.2 Name the independent variable. (1)

2.3.3 Explain why the dry bread was included in the experiment. (2)

2.3.4 State ONE way Lerato can improve the reliability of her investigation. (1)

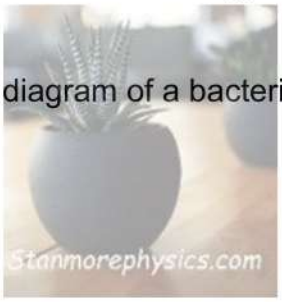
2.3.5 Name the treatment that enhanced fungi growth on bread the most. (1)

2.3.6 Give TWO ways Lerato ensured that the results of this investigation were valid. (2)

2.3.7 Explain why fungi is heterotrophic. (2)

2.3.8 Explain the role of fungi in a food web. (2)
(14)

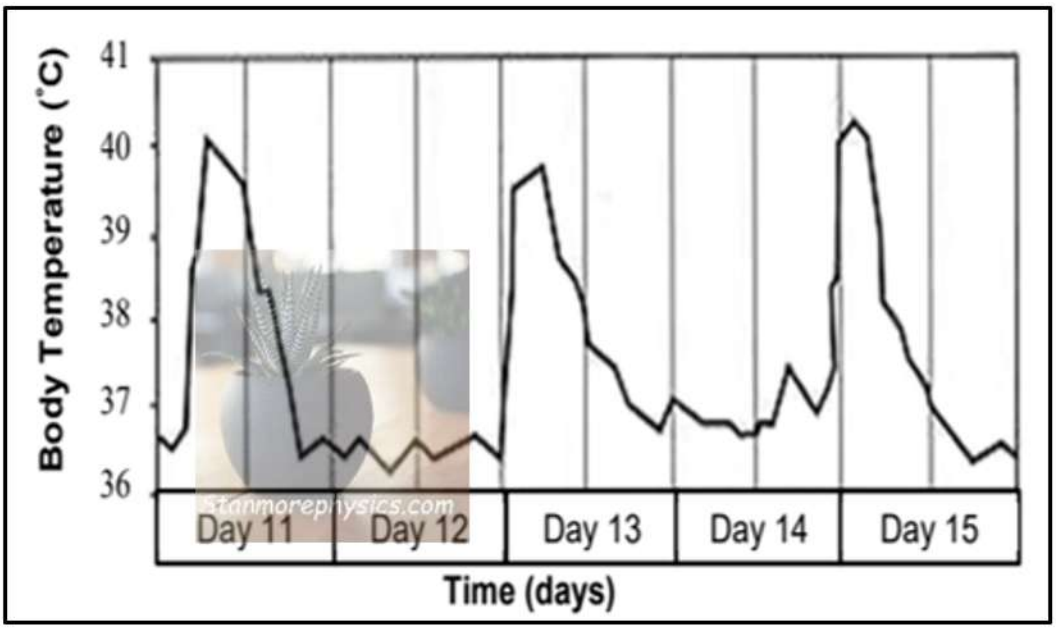
2.4 Draw a labelled diagram of a bacterium. **(4)**



2.5 Read the extract below.

Malaria is cause by the genus *Plasmodium* and it is transmitted by the *Anopheles* mosquito. The symptoms are fever, headaches and vomiting. After infection the parasite moves in the bloodstream to the liver. The new parasite then enters the blood and multiplies within the red blood corpuscles. When the red blood corpuscles burst open it causes a very high fever in humans.

The graph below shows the body temperature of a malaria patient over five days



2.5.1 Name the kingdom of micro-organisms *Plasmodium* belongs to. (1)

2.5.2 Name ONE organ that the *Plasmodium* affects. (1)

2.5.3 Give TWO symptoms of malaria. (2)

2.5.4 Use the graph and determine how many times this patient's red blood corpuscles burst open in the 5 days. (1)

2.5.5 Name TWO ways in which you can prevent infection of a malaria mosquito. (2)
(7)

TOTAL QUESTION 2 **[50]**

QUESTION 3

3.1 The table below shows the changes in the population size of impala (a type of fast-moving buck) in a game reserve over a 10-year period.

Year	Number of impalas
1995	18
1996	20
1997	23
1998	48
1999	82
2000	145
2001	150
2002	151
2003	147
2004	135

3.1.1 Identify TWO population parameters that could have increased the population size between 1995 and 2002. (2)

3.1.2 Draw a line graph to represent the data in the table. (6)

3.1.3 Name ONE direct method that may have been used to calculate the size of the impala population over this period. (1)

3.1.4 In 2007, a fire broke out in a part of the game reserve reducing the carrying capacity for impala in the reserve to 140. To compare the population size to the carrying capacity, 15 impalas were captured, marked and released. One month later 40 impalas were recaptured and of these 5 were found to be marked.

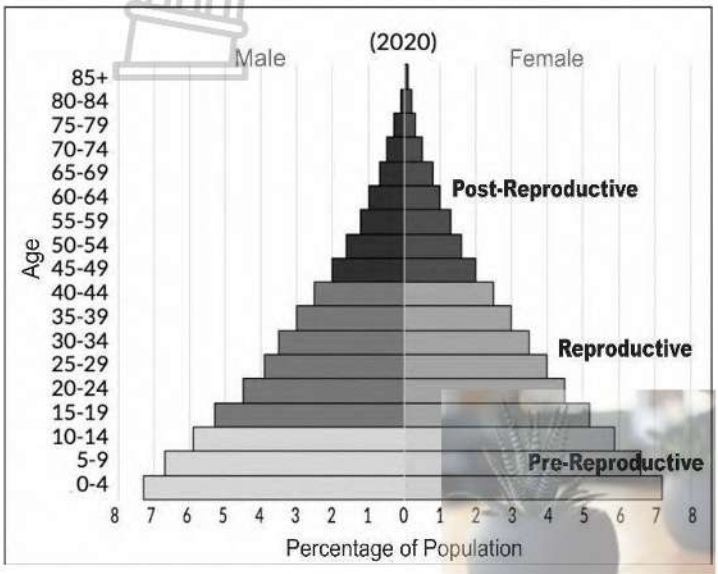
(a) Calculate the size of the impala population, using the Lincoln-Petersen index ($P = \frac{M \times S}{T}$). Show all workings. (3)

(b) Is the impala population size above or below the carrying capacity of the reserve? (1)

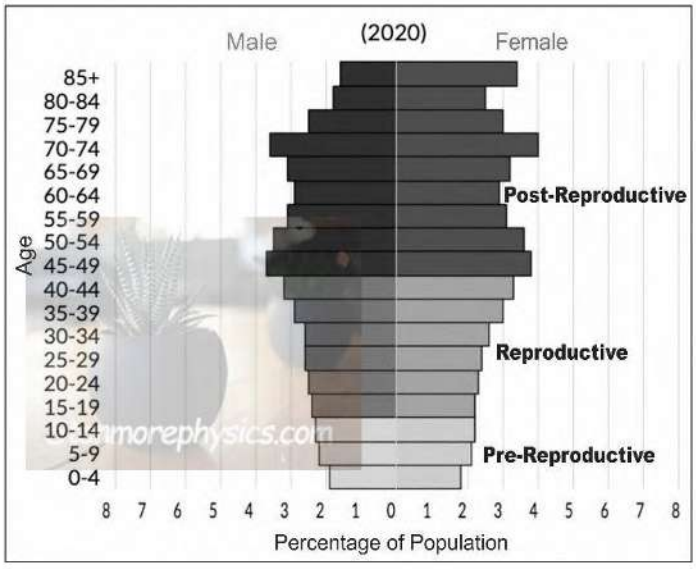
3.1.5 List TWO precautions that must be followed when using the method described in QUESTION 3.1.3 to estimate population size. (2)
(15)

3.2 The diagrams below represent age and gender population pyramids of two different countries.

Country A



Country B



3.2.1 Give the LETTER of the country that fits the description below:

a) Decrease in birth rate and lower mortality (1)

b) Less developed country (1)

3.2.2 Identify the percentage of the female population between the ages 70 to 74 in Country **B**. (1)

3.2.3 According to the information in the pyramids, identify the age when girls can start to reproduce? (1)

3.2.4 Give TWO reasons for the low mortality rate in developed countries (2)
(6)

3.3 Invasive alien plant species are causing billions of rands of damage to South Africa's food security every year, and are the single biggest threat to the country's biological biodiversity. Of the estimated 9000 plants introduced to this country, 198 are currently classified as being invasive. It is estimated that these plants cover about 10% of the country and the problem is growing at an exponential rate.

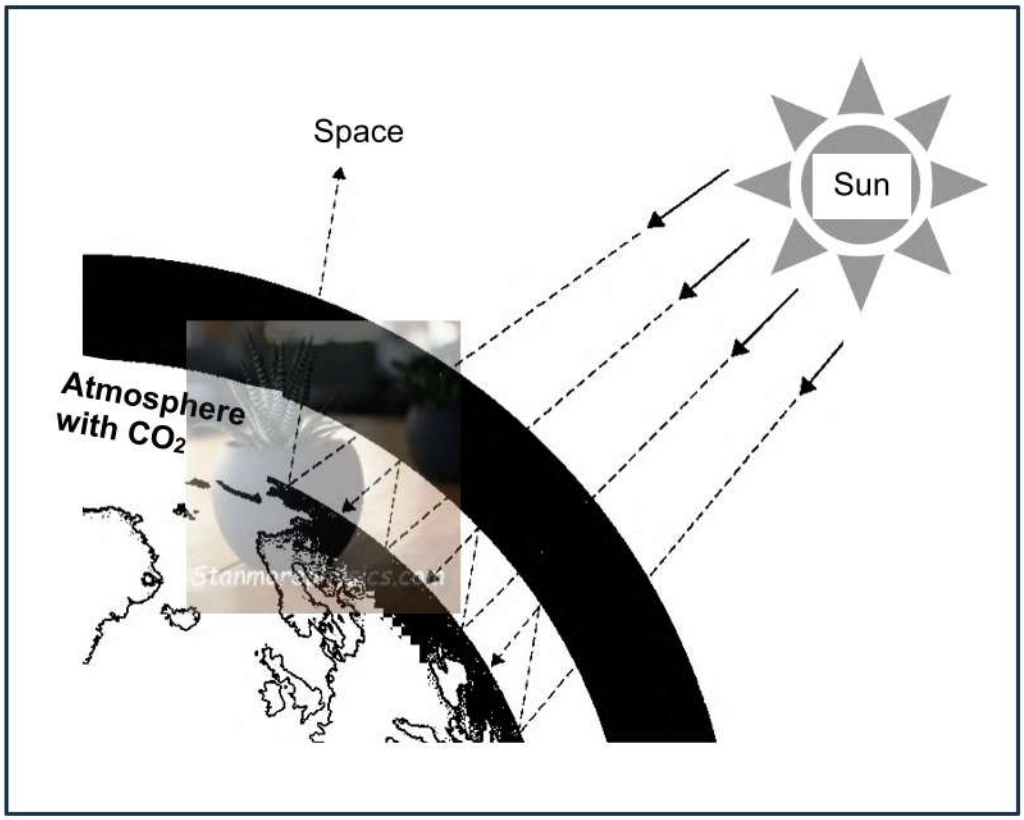
3.3.1 Define *alien plant species*. (2)

3.3.2 Calculate the estimated percentage of invasive alien plant species in South Africa. (Show all your calculations) (3)

3.3.3 Describe how alien plants affect food security in South Africa. (4)

3.3.4 Explain THREE ways how alien plant invasions can be controlled in South Africa. (6)
(15)

3.4 The diagram below represents the Greenhouse effect.



3.4.1 Name TWO Greenhouse gases, other than carbon dioxide. (2)

3.4.2 Name TWO human activities that increase carbon dioxide concentration in the atmosphere. (2)

3.4.3 Describe the Greenhouse effect. (2)

3.4.4 What is the significance of the Greenhouse effect for humans? (2)

3.4.5 Name THREE effects of global warming. (3)

3.4.6 Give THREE strategies to reduce your carbon footprint. (3)
(14)

TOTAL QUESTION 3 [50]
TOTAL SECTION B: 100

GRAND TOTAL: 150

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MARKING GUIDELINES

These marking guidelines consist of 10 pages.

PRINCIPLES RELATED TO MARKING LIFE SCIENCES

1. **If more information than marks allocated is given**
   Stop marking when maximum marks is reached and put a wavy line and 'max' in the right-hand margin.

2. **If, for example, three reasons are required and five are given**
   Mark the first three irrespective of whether all or some are correct/incorrect.

3. **If whole process is given when only a part of it is required**
   Read all and credit the relevant part.

4. **If comparisons are asked for but descriptions are given**
   Accept if the differences/similarities are clear.

5. **If tabulation is required, but paragraphs are given**
   Candidates will lose marks for not tabulating.

6. **If diagrams are given with annotations when descriptions are required**
   Candidates will lose marks.

7. **If flow charts are given instead of descriptions**
   Candidates will lose marks.

8. **If sequence is muddled and links do not make sense**
   Where sequence and links are correct, credit. Where sequence and links are incorrect, do not credit. If sequence and links become correct again, resume credit.

9. **Non-recognised abbreviations**
   Accept if first defined in answer. If not defined, do not credit the unrecognised abbreviation but credit the rest of the answer if correct.

10. **Wrong numbering**
    If answer fits into the correct sequence of questions but the wrong number is given, it is acceptable.

11. **If language used changes the intended meaning**
    Do not accept.

12. **Spelling errors**
    If recognisable, accept the answer, provided it does not mean something else in Life Sciences or if it is out of context.

13. **If common names are given in terminology**
    Accept, provided it was accepted at the memo discussion meeting.

14. **If only the letter is asked for but only the name is given (and vice versa)**
    Do not credit.

15. **If units are not given in measurements**
    Candidates will lose marks. Memorandum will allocate marks for units separately.

16. **Be sensitive to the sense of an answer, which may be stated in a different way.**

17. **Caption**
    All illustrations (diagrams, graphs, tables, etc.) must have a caption.

18. **Code-switching of official languages (terms and concepts)**
    A single word or two that appear(s) in any official language other than the learner's assessment language used to the greatest extent in his/her answers should be credited if it is correct. A marker that is proficient in the relevant official language should be consulted. This is applicable to all official languages.

SECTION A

QUESTION 1

1.1	1.1.1	D✓✓		
	1.1.2	B✓✓		
	1.1.3	B✓✓		
	1.1.4	C✓✓		
	1.1.5	C✓✓		
	1.1.6	A✓✓		
	1.1.7	C✓✓		
	1.1.8	B✓✓		
	1.1.9	D✓✓		**(20)**
	1.1.10	A✓✓	(10 x 2)	

1.2	1.2.1	Methane✓		
	1.2.2	Rhizoid✓		
	1.2.3	Eutrophication✓		
	1.2.4	Pistil✓		
	1.2.5	Population✓		
	1.2.6	Invertebrates✓		
	1.2.7	Food security✓		
	1.2.8	Monoculture✓		
	1.2.9	Ozone✓		
	1.2.10	Antibiotics✓	(10 x 1)	**(10)**

1.3	1.3.1	Only A✓✓		
	1.3.2	Only B✓✓		
	1.3.3	Only B✓✓	(3 x 2)	**(6)**

1.4	1.4.1	(a) Pinna✓ / Sori / Compound leave/ leave/ Fronds	(1)
		(b) Adventitious root✓	(1)
	1.4.2	(a) Pteridophytes✓	(1)
		(b) B✓ and D ✓	(2)
		(c) 1✓ and 2✓	(2)
		(d) 3✓	(1)
			(8)
1.5	1.5.1	Predator-prey relationship✓	(1)
	1.5.2	B✓	(1)
	1.5.3	1989-1990✓ – 1995-1996✓	(2)
	1.5.4	1995✓	(1)

1.5.5
- (Increased) competition✓
- Decrease in living space✓
- Shortage of shelter✓
- Easy spread of diseases and parasites✓/diseases (1)

(Any 1) **(6)**

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1.1 Phylogenetic tree is a diagram that shows the evolutionary relationship between different organisms.✓✓ (2)

2.1.2 (a) (iv) ✓/Radially symmetrical and tissue level of organisation (1)

(b) (ii)✓/ Bilaterally symmetrical and Triploblastic (1)

(c) (iii)✓/ Segmentation and Coelom (1)

(d) (i) ✓/ Two opening gut and open blood system (1)

2.1.3 Vertebral column✓ /Vertebrate column (1)

2.1.4
- Ectoderm✓
- Endoderm✓ (2)

2.1.5 It has a concentration of nerves and sensory organs✓ at one end of the organism.✓ (2)
(11)

(1)

2.2.1 Angiosperms✓

(2)

2.2.2 (a) B✓ - petals✓

(2)

(b) D✓ - ovary✓

(2)

(c) C✓ - Stigma✓

(1)

2.2.3 1✓

2.2.4
- Has a small flower✓
- Small petals✓
- Long filaments hanging outside the flower✓
- Anthers are large✓
- Stigma are long and feather-like✓with a huge surface area. (Any 3) (3)

2.2.5 - Male gamete✓ (sperms) fuses with a female gamete✓ (ova) to form a zygote✓ (3)
(14)

2.3.1 - Humidity/moisture✓
- Warm environment✓
- Dark environment✓ (3)

2.3.2 Different treatments ✓ (1)

2.3.3 It is used as the control/baseline✓ to compare the results with✓
To ensure that it is the treatment✓ that is responsible for the effect of the fungi coverage/growth✓ (2)
(Mark first TWO only)

2.3.4
- Repeat the investigation✓
- Use more than one slice of bread in each treatment✓ (Increase the sample size 🎁) (1)

(Mark first ONE only)

2.3.5 (1)

Sugar water✓

2.3.6
- The bread treated with 20 ml of different treatments✓
- The treatment was spread evenly across the slice of bread✓
- The treatment was done for one weak✓
- The slices of bread were in the same zip lock bags✓ (2)

(Mark first TWO only)

2.3.7 (2)

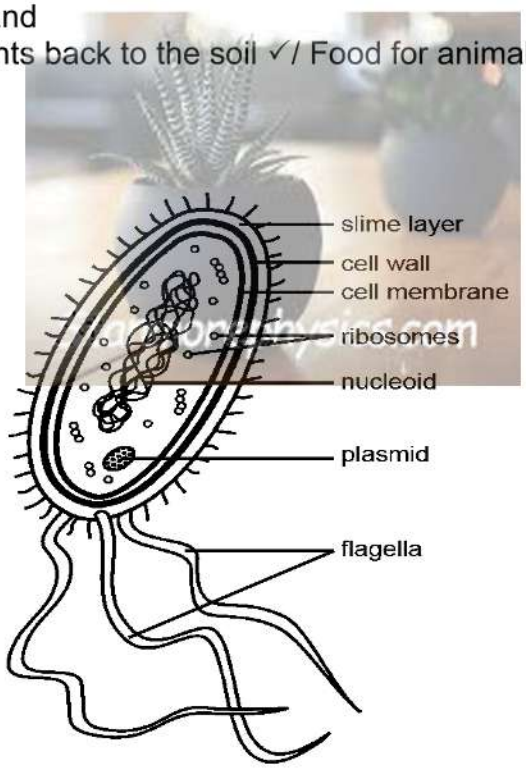
Fungi does not have chlorophyll✓/cannot photosynthesis and cannot produce food for themselves ✓ through photosynthesis

2.3.8

-Fungi are saprophytes✓/ break down dead organic material / decomposers and
- recycle nutrients back to the soil ✓/ Food for animals (2)
(14)

2.4

Bacteria



Criteria for marking the diagram

Title of the diagram.	(C)	1
Correct organism drawn	(D)	1
1-2 Correct Labels All 3 Labels correctly drawn	(L)	1 2

(4)

2.5.1 Protista✓ (1)

2.5.2 Liver✓ (1)

2.5.3
- Flu symptoms✓
- Fever✓
- Headache✓
- Joint pain✓
- Vomiting✓
- Anaemia✓
- Convulsions✓

(Mark first TWO only) (2)

2.5.4 3✓ (1)

2.5.5
- Treatment✓/anti-malaria drugs
- Elimination of the vector✓/Spray the inner walls of house/use Insecticides as DDT
- Insect repellent✓
- Use mosquito nets✓
- Clothes with long sleeves✓

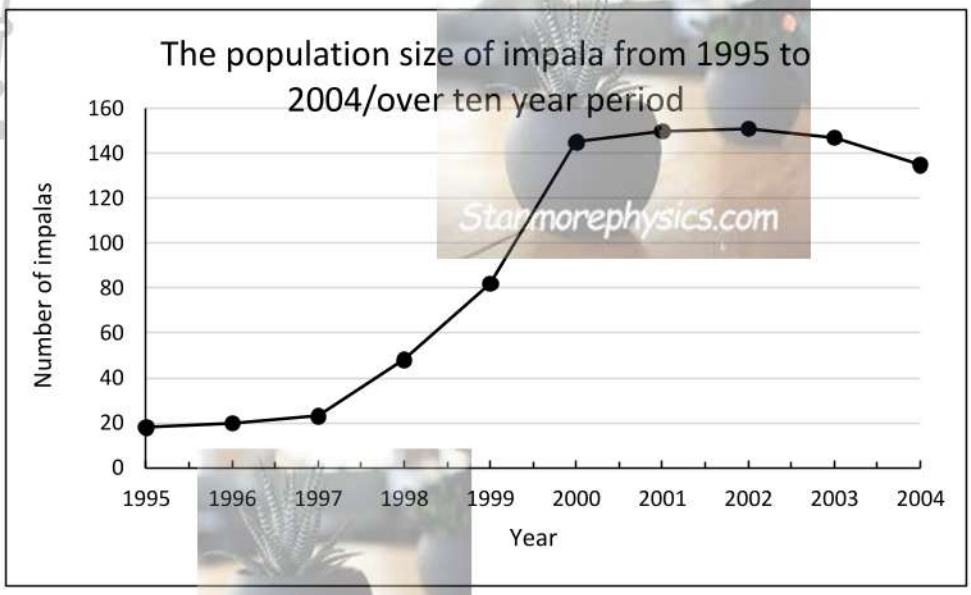
(Mark first TWO only) (2)
(7)

TOTAL QUESTION 2: [50]

QUESTION 3

3.1.1 Natality✓
Immigration✓ (2)

3.1.2



(6)

Criteria for marking of the graph:

Criteria	Mark allocation
Line graph in drawn (**T**)	1
Caption of the graph includes both variables (**C**)	1
Correct labels on the X-axis and Y-axis with correct unit on the Y-axis (**L**)	1
Correct scale for Y-axis and years plotted evenly (**S**)	1
Plotting (**P**) correctly done for: 1 – 8 All 10	 1 2

3.1.3
- Census✓
- Counting✓
- Aerial photographs✓

(Mark first ONE only) (1)

3.1.4 (a) $P = \frac{M \times S}{T}$

$= \frac{(15 \times 40)}{5}$ ✓ ✓

$= \frac{600}{5}$

$= 120$ ✓ impalas (3)

(b) Below✓ (1)

3.1.5
- The marking methods should not injure or damage the organism✓
- The marks should be clearly visible for the duration of the investigation✓
- The marking method should not affect the movement of behavior of the organism✓
- Marked organisms should be allowed enough time to mix with the rest of the population before the next sample is taken✓
- The population must be closed, so no immigration or emigration takes place.✓

(Mark first TWO only) (2)
(15)

3.2.1 (a) B✓ (1)
(b) A✓ (1)

3.2.2 4✓% (1)

3.2.3 15✓ Years (1)

3.2.4
- Good medical care✓
- Good nutrition✓
- Good education ✓

(Mark first TWO only) (2)
(6)

3.3.1 Organisms that occupy area outside their natural habitat. ✓✓ (2)

3.3.2 $\frac{198}{9000}$ ✓ x 100✓

= 2,2%✓ (3)

3.3.3 Deplete the topsoil✓ of water and nutrients.
Alien plants out-compete indigenous plants; ✓
No natural predators✓
Growing rapidly✓
Decreasing Food security✓ (Any 4)
(4)

3.3.4 Mechanical control✓ – Chopping down plants of physically removing them by hand✓
Chemical control✓ - Spraying herbicides on the plants✓
Biological control✓ - Using a natural enemy from the alien plant✓
(Mark first THREE only) (6)
(15)

3.4.1 Methane✓ and Ozone✓ (2)

3.4.2 Burning of fossil fuel✓
Deforestation✓ (2)

3.4.3 Greenhouse gases absorb long wave/infrared radiation emitted✓ from the Earth and prevent it from escaping back into the atmosphere✓ (2)

3.4.4 It increases the temperature of earth✓ to ensure that life on earth is possible✓ (2)

3.4.5
- More evaporation flooding✓
- Rising sea levels ✓
- Increased wildfires ✓
- Increased loss of biodiversity ✓
- Increased droughts✓ (Any 3) (3)

3.4.6
- Reuse and recycle✓
- Drive less✓
- Reduce the need for heating✓
- Use an alternativities energy source ✓
- Technology developments ✓ (Any 3) (3)
(14)

TOTAL QUESTION 3: [50]

TOTAL SECTION B: 100
GRAND TOTAL: 150