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Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11

NOVEMBER 2025

LIFE SCIENCES P2

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 answer 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. ALL drawings MUST be done in pencil and labelled 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. All calculations to be rounded off to TWO decimal places.
12. 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–D) next to the question numbers (1.1.1 to 1.1.9) in the ANSWER BOOK, for example 1.1.10 D.

1.1.1 Organisms that cannot move since they are permanently attached to a surface are known as …

A autotrophic.
B sessile.
C porifera.
D motile.

1.1.2 Which of the following is the role of micro-organisms in the nitrogen cycle?

A Photosynthesis
B Binary fission
C Nitrification
D Cause diseases

1.1.3 A feature of a developing country is …

A an expanding older age population.
B a decreasing younger age population.
C inadequate health facilities.
D a high literacy rate.

1.1.4 Flowers with large, feathery stigmas to catch pollen are …

A wind pollinated.
B insect pollinated.
C bird pollinated.
D water pollinated.

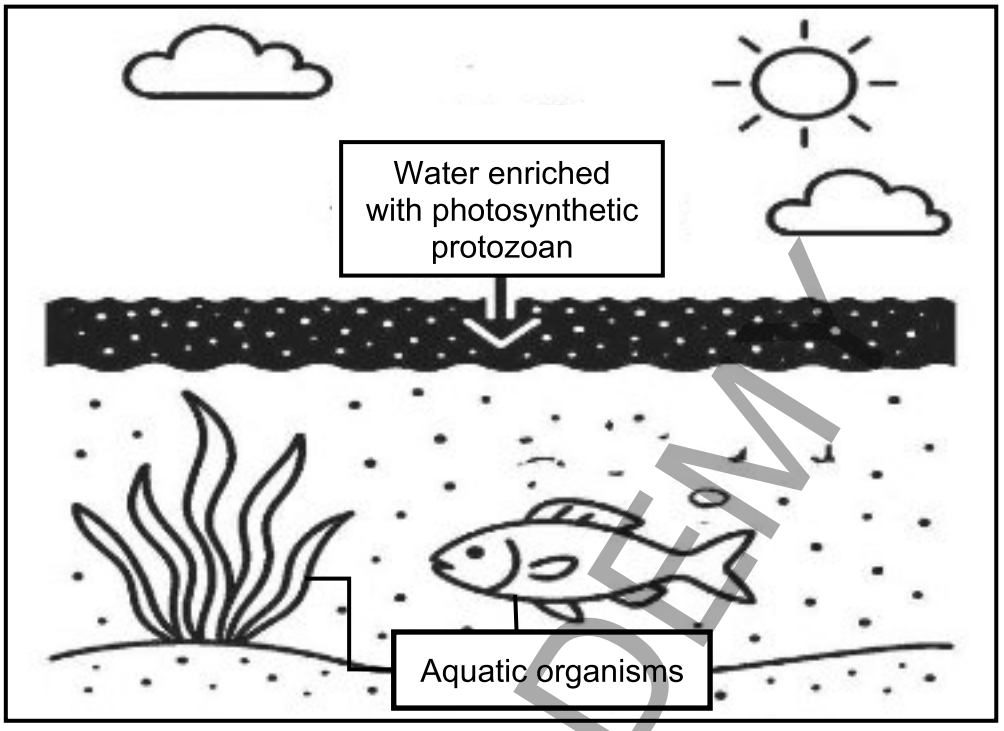
1.1.5 A common characteristic for all micro-organisms is that they are …

A Found only in soil.
B photosynthetic.
C microscopic.
D harmful.

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1.1.6 The diagram below represents a process that negatively affects marine life.



Which ONE of the following descriptions represents the process and events occuring in this habitat?

	Process	Nutrients (nitrogen, phosphorus)	Aquatic organisms
A	Eutrophication	Increase	Survive
B	Algal bloom	Increase	Survive
C	Eutrophication	Decrease	Die
D	Algal bloom	Increase	Die

1.1.7 Which ONE of the following factors has yielded better crops that have contributed to the human exponential growth over the past century?

A Ozone layer depletion
B Technological improvements
C Agricultural improvements
D Medicinal improvements

1.1.8 Viruses are considered living only when they …

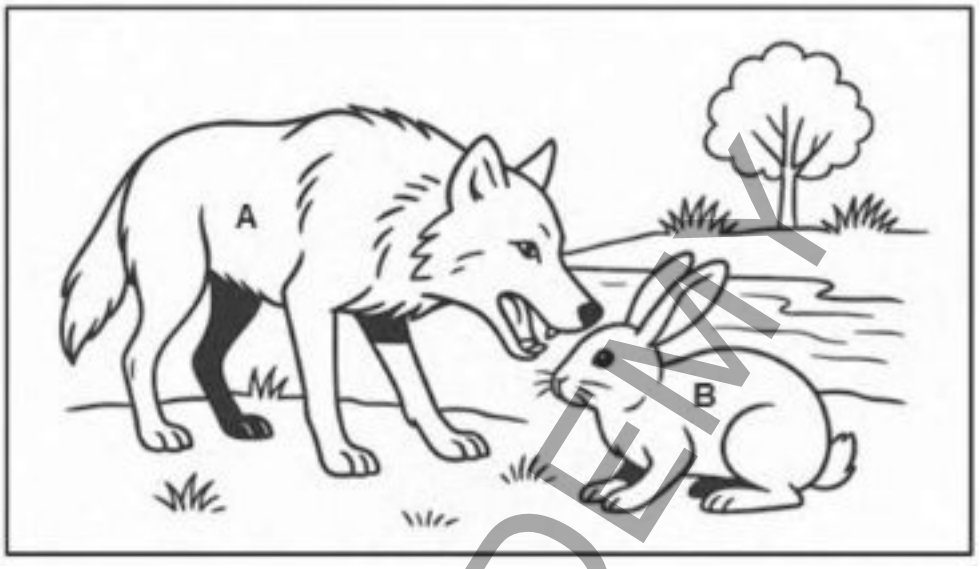
A are in soil.
B contain RNA.
C have a nucleus.
D reproduce inside a host cell.

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1.1.9 The diagram below represents an interaction in a particular ecosystem. Both populations undergo logistic growth.

What is likely to happen to the logistic growth form over the course of these species' survival?



A The population size of **B** will always increase exponentially due to unlimited resources
B The population size of both **A** and **B** will always increase
C Population size of both **A** and **B** fluctuates over time with the species **B** population increasing first
D Population size of both **A** and **B** fluctuates over time with the population of **A** increasing first (9 x 2) (18)

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 1.2.8) in the ANSWER BOOK.

1.2.1 A diagram that shows the distribution of age and gender for a population

1.2.2 A plant structure that contains an embryo which results from a fertilised ovule

1.2.3 A study of interactions between living organisms and their environment

1.2.4 A process in which white blood cells engulf and digest harmful pathogens

1.2.5 The movement of individuals of a population out of a habitat

1.2.6 The collective name for a filament and an anther

1.2.7 A method of controlling alien invasive plant species by introducing their natural enemy into the environment

1.2.8 The average number of years a person is expected to live (8 x 1) (8)

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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	An organism that transmits pathogens from one host to another	A:	Vector
		B:	Anopheles female mosquito
1.3.2	Division of resources by different species which reduces competition and enables coexistence	A:	Resource partitioning
		B:	Competitive exclusion
1.3.3	An avascular plant	A:	Bryophyte
		B:	Gymnosperm

(3 x 2) (6)

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1.4 The diagrams below represent two pathogenic micro-organisms to humans.

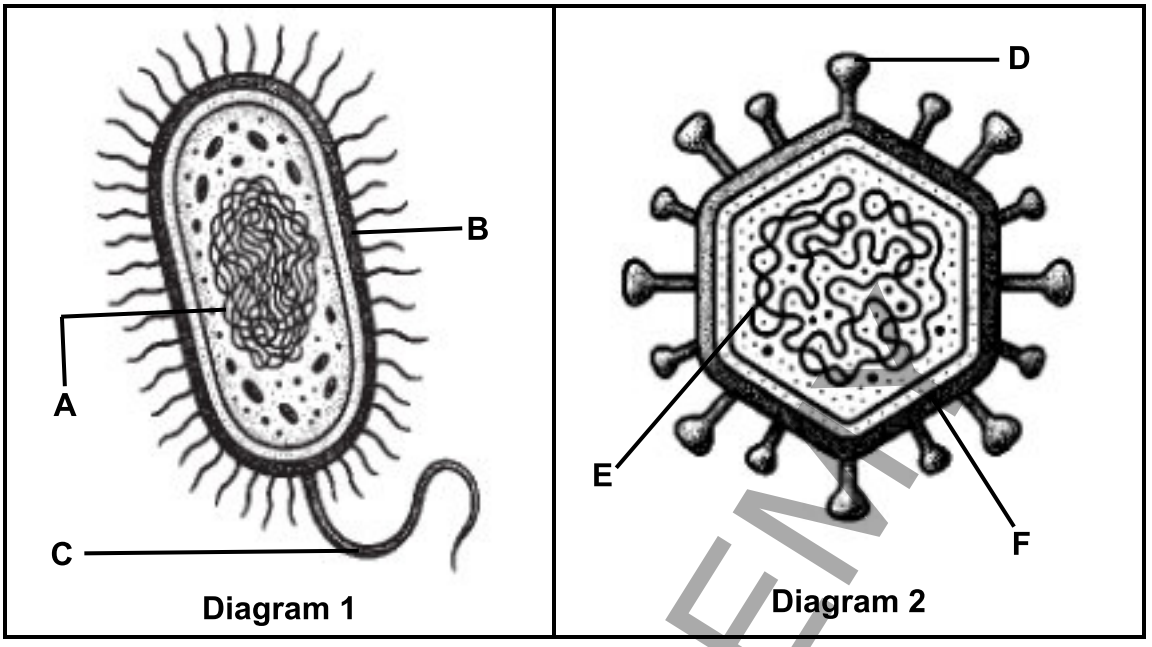


Diagram 1 Diagram 2

1.4.1 Identify the micro-organism in diagram **1**. (1)

1.4.2 Label parts:

(a) **C** (1)

(b) **D** (1)

1.4.3 Which diagram **(1** or **2)** represents a pathogenic micro-organism that:

(a) Causes HIV/Aids infection? (1)

(b) Develops resistance to antibiotics? (1)

1.4.4 Write only the TWO LETTERS of the organelles that contain genetic material in both diagrams. (2)

1.4.5 Give the name of the:

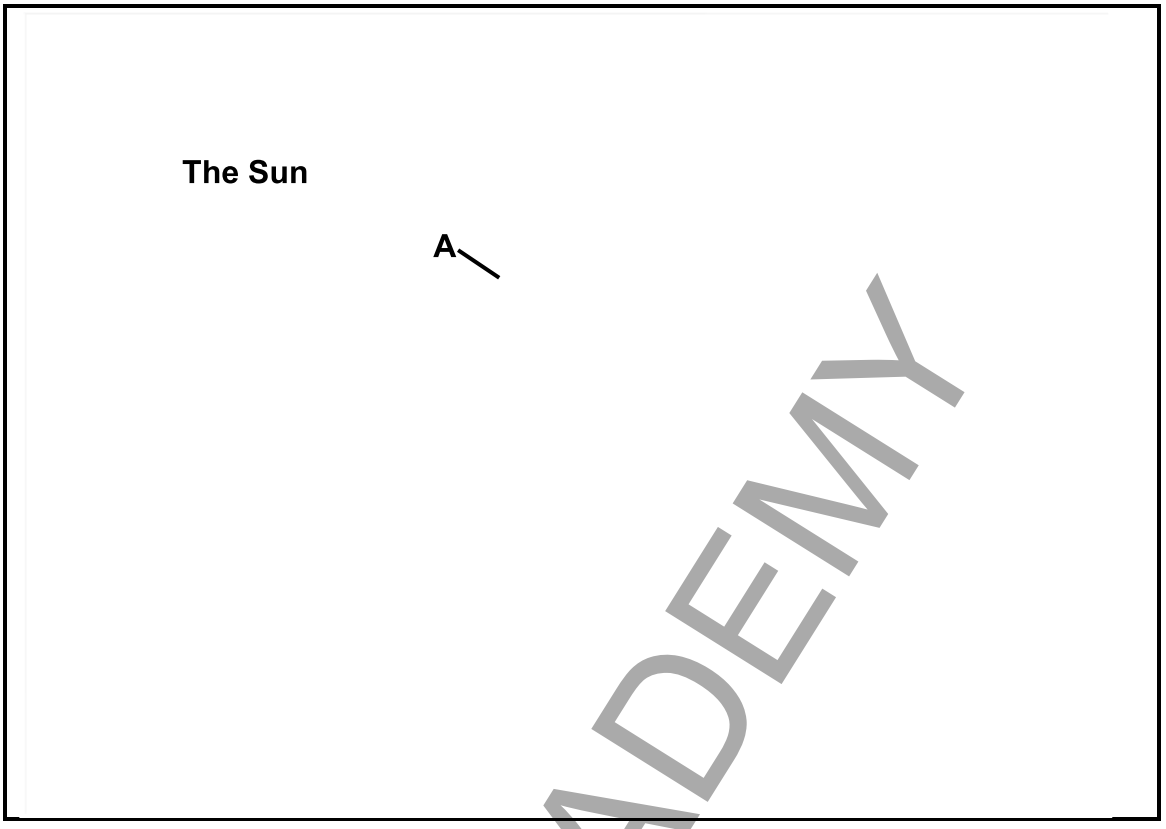
(a) Circular structure used in insulin production by organisms in diagram **1** (1)

(b) Type of micro-organism as in diagram **2** that attacks organisms in diagram **1** (1)

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1.5 The diagram below illustrates the greenhouse effect.



1.5.1 Identify the type of energy emitted by the sun in this greenhouse effect. (1)

1.5.2 State what happens to the type of energy identified in QUESTION 1.5.1 at point **A**. (1)

1.5.3 Give TWO greenhouse gases that enhance the greenhouse effect in the atmosphere. (2)

1.5.4 Name the phenomenon that exists when:

(a) The average global temperatures increase on Earth (1)

(b) Humans cut-down trees for their own benefit (1)

(c) There is a change in weather patterns over a long time (1)

(d) The total amount of greenhouse gases emitted directly or indirectly by an individual per year (1)

1.5.5 Name the human activity that enhances the greenhouse effect in the production of electricity. (1)

TOTAL SECTION A: 50

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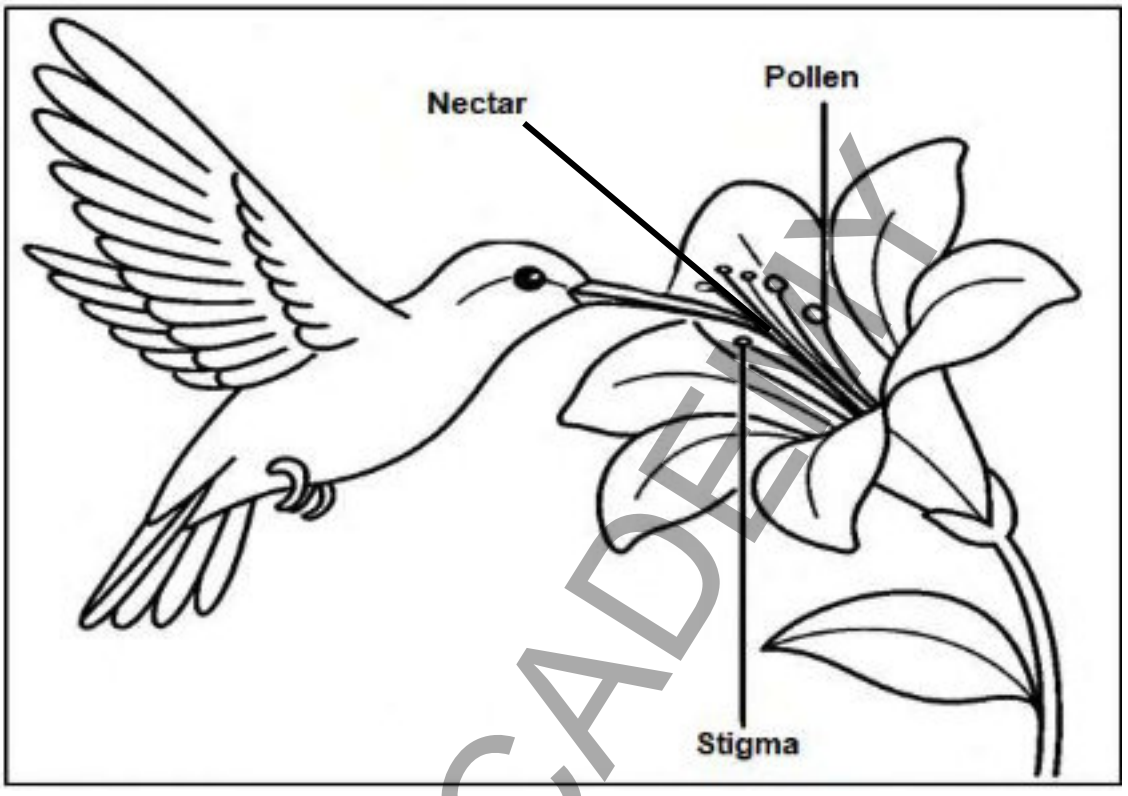
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SECTION B

QUESTION 2

2.1 The diagram below shows a hummingbird pollinating a plant.



2.1.1 Name the plant division represented by the plant in the diagram above. (1)

2.1.2 State TWO unique characteristics of the plant division named in QUESTION 2.1.1. (2)

2.1.3 Identify the labelled part which:

(a) Produces a male gamete (1)

(b) Is located on top of the pistil (1)

(c) Attracts the hummingbird to this plant (1)

2.1.4 Explain the significance for reproduction, of having both male and female reproductive parts being close to each other in this plant. (3)

2.1.5 Name another pollinating agent that is attracted by a strong scent produced by other plants. (1)

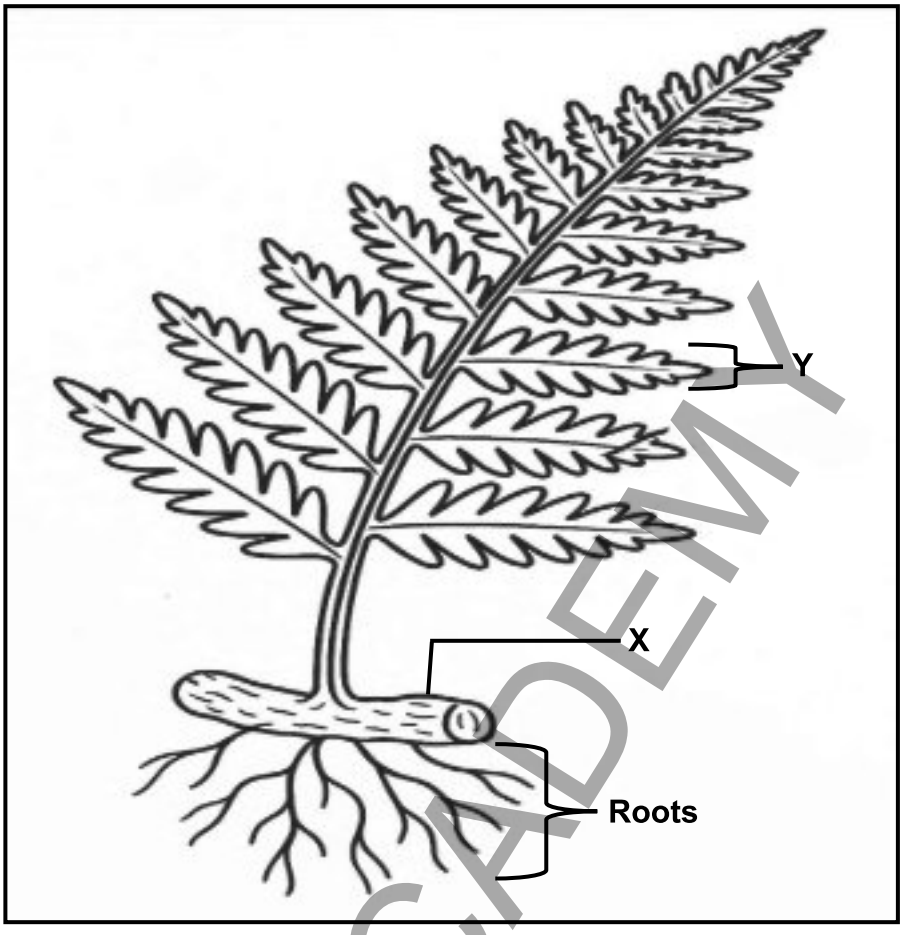
2.1.6 Discuss TWO important roles the process of pollination plays for plant survival in ecosystems. (4)

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2.2 The diagram below shows a pteridophyte (fern) plant.



2.2.1 Identify the type of:

(a) Stem at **X** (1)

(b) Leaf at **Y** (1)

2.2.2 Name the cluster of sporangia that are usually found on the underside of the leaf at **Y**. (1)

2.2.3 Tabulate ONE difference between the plant sizes of pteridophytes in comparison to bryophytes. (3)

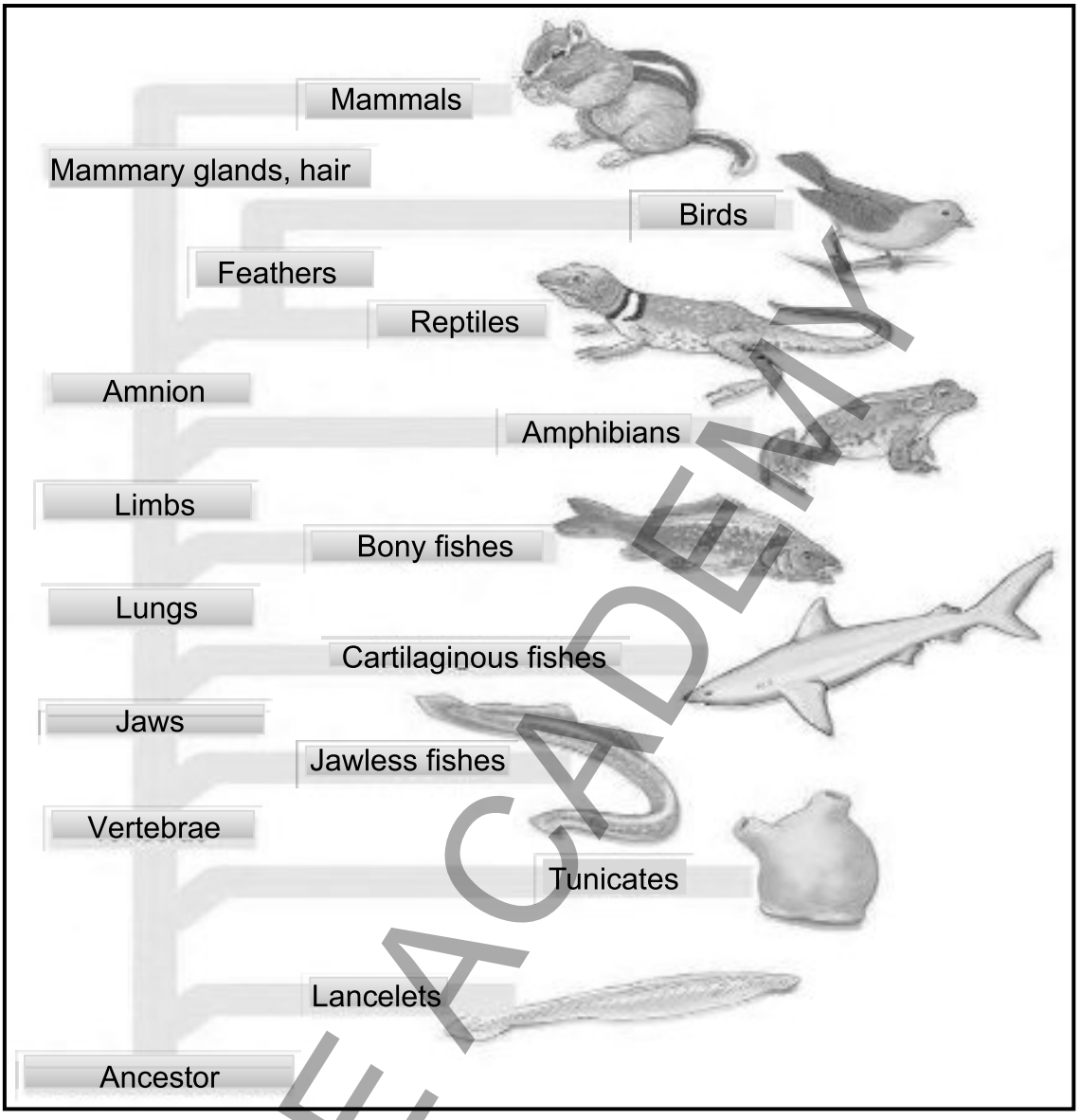
2.2.4 Name TWO vascular tissues that are found in the roots of this fern plant. (2)

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2.3 The phylogenetic tree below shows different organisms that belong to the most evolved phylum in the animal kingdom.



2.3.1 Identify the:

(a) Phylum represented by the diagram above (1)

(b) TWO organisms in the diagram above that lack a backbone (2)

2.3.2 Some organisms that belong to the animal group identified in QUESTION 2.3.1(b) are also found on land.

Explain the role played by those organisms in agriculture. (3)

2.3.3 Name the:

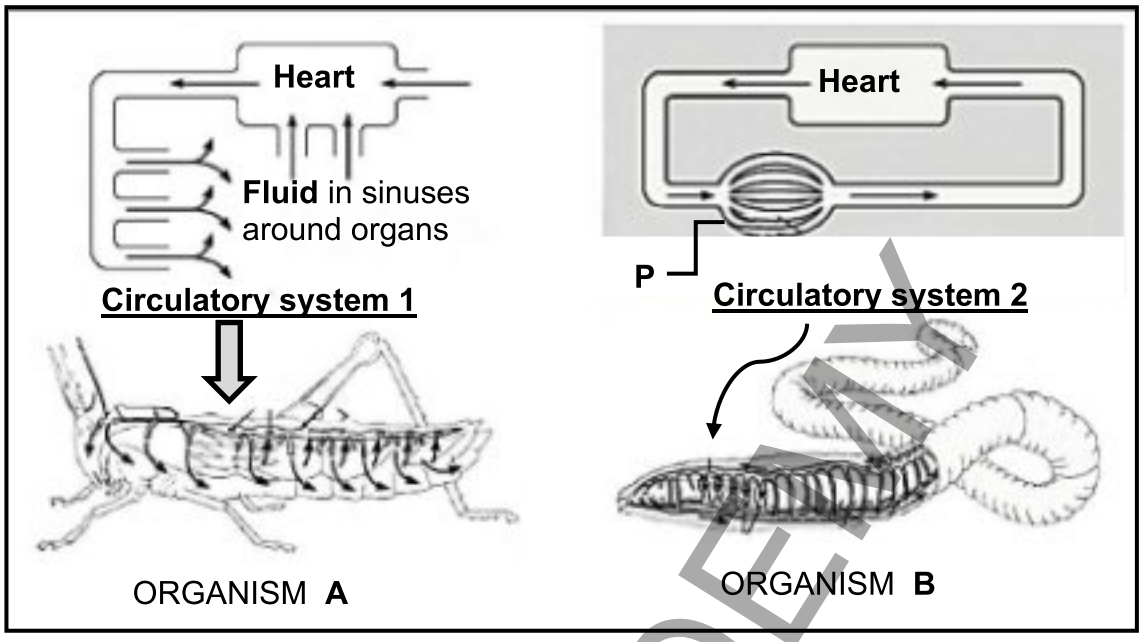
(a) Characteristic shared by mammals, birds and reptiles (1)

(b) Group of organisms with the most advanced evolutionary features (1)

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2.4 The diagrams below represent two circulatory systems that exist in different animals.



2.4.1 Identify the type of:

(a) Blood circulatory system **1** (1)

(b) Blood vessel **P** (1)

2.4.2 Name TWO useful substances that are transported in blood vessel **P** of organism **B** that assist in its survival. (2)

2.4.3 Describe the type of body symmetry associated with organism **A.** (2)

2.4.4 Name the fluid filled body cavity that:

(a) Acts as a hydrostatic skeleton in organism **B** (1)

(b) Plays a role in nutrient distribution and waste removal in organism **A** (1)

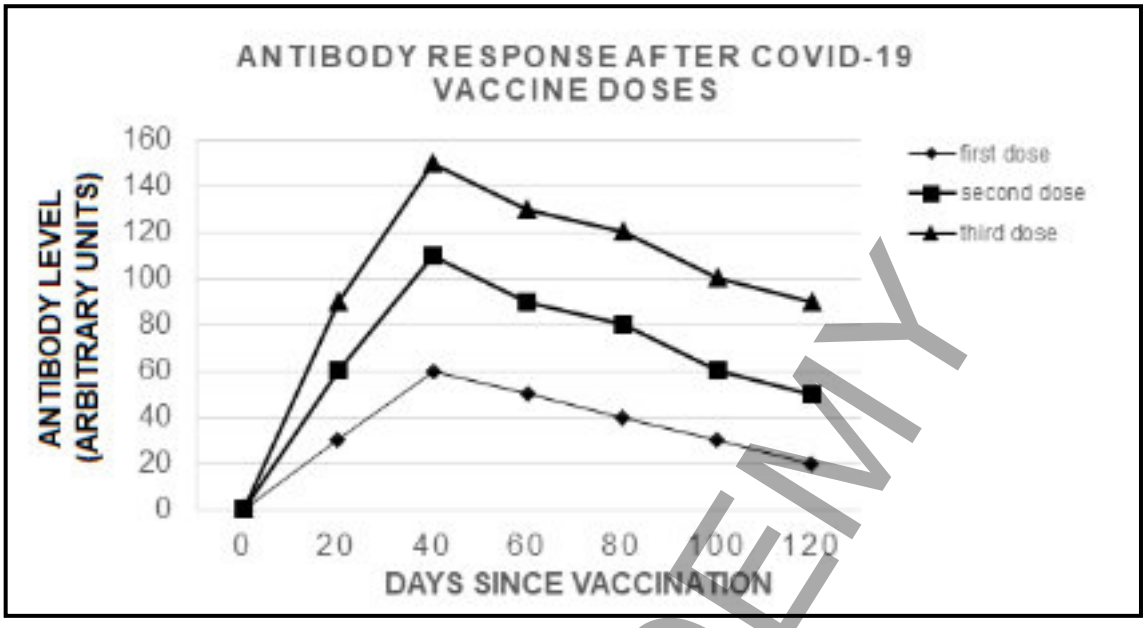
2.4.5 Give TWO benefits of having segmented body plans displayed by organism **A** and **B.** (2)

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2.5 The graphs below show the antibody response after Covid-19 vaccine doses in 6 245 participants in the United States of America (USA).



2.5.1 State what happens to antibody levels after Covid-19 vaccine is initially administered on day 0 to 40. (1)

2.5.2 Give the:

(a) Antibody level two months after the second Covid-19 vaccine dose was administered (1)

(b) Type of immunity the Covid-19 vaccine offers to patients (1)

(c) Cells in the immune system that produce antibodies (1)

2.5.3 Give ONE reason why 6 245 participants were used instead of 60 participants in this study. (2)

2.5.4 Give the main active component of a vaccine. (1)

2.5.5 Based on the information on the graphs over the 120-day period, explain why it is necessary for people to take the third dose of the Covid-19 vaccine dose. (3)

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QUESTION 3

3.1 An aging population together with low-fertility rates has seen the population of Japan decline rapidly in recent years. Japan had a population size of 126,9 million people in 2016.

The table below shows the annual population decrease rate from 2016 to 2024 in Japan. The population decrease rate is calculated by subtracting the number of deaths from the number of births.

PERIOD (Years)	POPULATION DECREASE
2016-2017	363 000
2017-2018	405 000
2018-2019	497 000
2019-2020	505 000
2020-2021	610 000
2021-2022	780 000
2022-2023	837 000
2023-2024	890 000

3.1.1 Define the term *population*. (3)

3.1.2 Describe the general trend that can be observed in the population size of Japan over this period. (2)

3.1.3 Calculate the percentage increase in the number of people by which Japan's population decreased from 2019–2020 and 2020–2021. Show ALL working. (3)

3.1.4 Explain TWO ways in which a negative population growth could negatively harm a country. (4)

3.1.5 Name ONE factor that might increase the population size of Japan. (1)

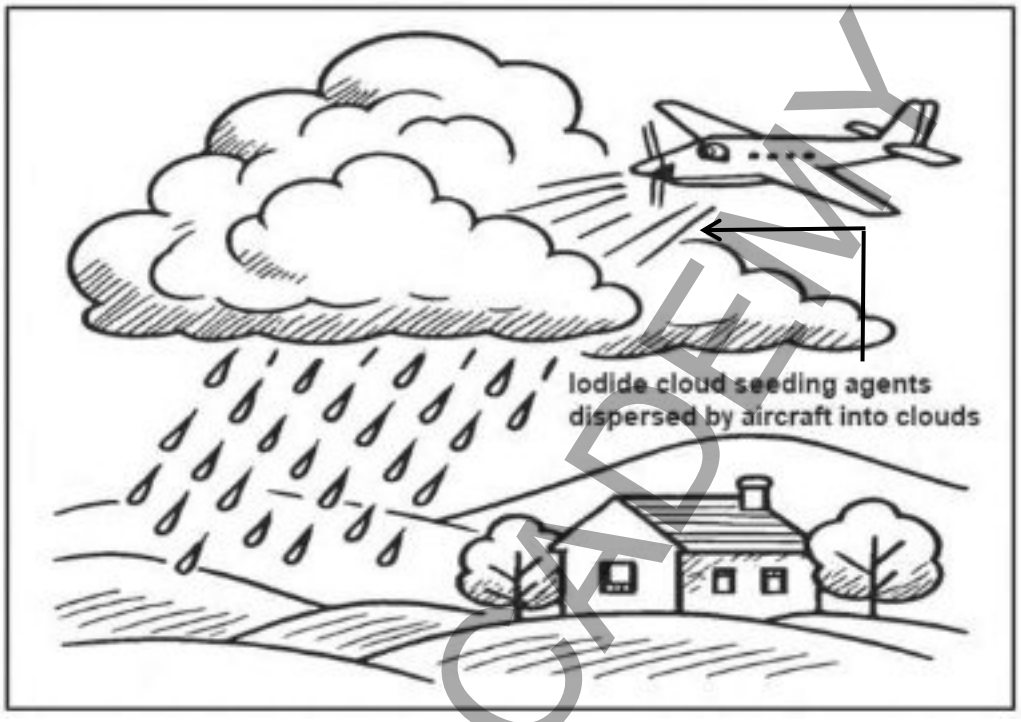
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3.2 Cloud seeding is a weather modification technique that introduces seeding agents (substances) such as silver/potassium iodide, dry ice as well as sodium chloride into the clouds. These seeding agents are usually transported by aircrafts into small clouds to allow them to condense and enlarge. This eventually increases rainfall in drought-affected regions.

The diagram below shows a schematic representation of how cloud seeding is performed.



3.2.1 Give TWO cloud seeding agents that are NOT dispersed by this aircraft. (2)

3.2.2 Name ONE human-made reservoir that will store water from the rainfall caused by cloud seeding. (1)

3.2.3 Explain ONE benefit on agriculture that cloud seeding has in regions affected by drought. (2)

3.2.4 Suggest THREE other strategies of increasing water availability in drought affected regions. (3)

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3.3 Scientists carried out an investigation to determine how different concentrations of microplastics affect the rate of photosynthesis in aquatic organisms such as algae.

They:

- Identified and cultured a freshwater algae (Chlorella vulgaris) in a lab.
- Prepared multiple beakers with growth medium and equal amounts of freshwater algae in each beaker. The beakers were divided into FOUR groups **A** to **D**.
- Added a microplastic (polyethylene microspheres) in the beakers with increasing concentrations of microplastic as follows:

GROUP	**A**	**B**	**C**	**D**
Concentration of microplastics (ppm)	0	10	50	100

Scientists further:

- Placed the samples/beakers under the same light and temperature conditions.
- Measured the rate of photosynthesis in the algae over a few days by using dissolved oxygen production, carbon dioxide uptake and chlorophyll fluorescence (red glow of excess energy given off by chlorophyll which is not used in photosynthesis).

The results of this investigation are tabulated below.

GROUP	**A**	**B**	**C**	**D**
Rate of photosynthesis (%)	100%	85%	67%	53%

3.3.1 For this investigation, identify the:

(a) Independent variable (1)

(b) Dependent variable (1)

3.3.2 State THREE ways in which the variable identified in QUESTION 3.3.1(b) was measured. (3)

3.3.3 Explain the purpose of:

(a) Including group **A** in this investigation (2)

(b) Placing the beakers under the same light and temperature condition during this investigation (2)

3.3.4 Draw a bar graph to represent the rate of photosynthesis in the groups with microplastics. (6)

3.3.5 Use the information in the table to explain how microplastics could negatively affect food security. (2)

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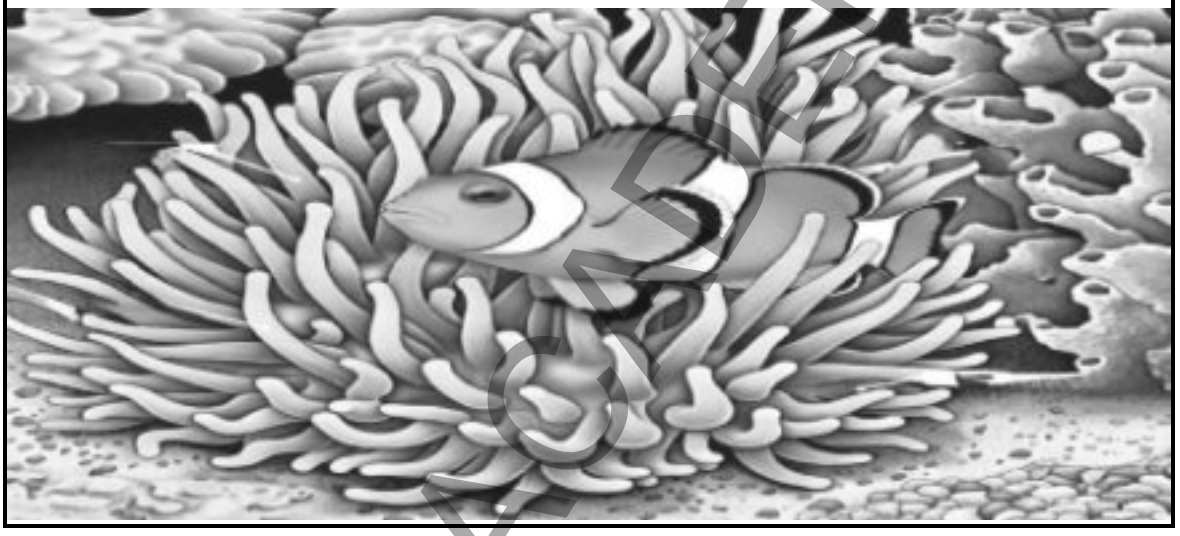
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3.4 Read the extract below.

THE CLOWNFISH AND THE SEA ANEMONE SYMBIOTIC RELATIONSHIP

The sea anemone has stinging tentacles made of nematocysts cells that it uses to catch prey. These tentacles release and inject a powerful venom into prey, which paralyses and kills the animal when in contact. This enables the sea anemone to use these tentacles to move food into its central single digestive opening.

The clownfish has found shelter in the sea anemone that allows it to escape predators by living and breeding within the sea anemone tentacles. The clownfish secrete a special mucus layer on their skin that protect them from the stinging tentacles of the sea anemone. The clownfish feeds on the leftovers from the sea anemone meals, helping to clean the tentacles. A limited number of sea anemones often leads to the death of many clownfish.



3.4.1 Name and describe the symbiotic relationship that exists between the sea anemone and the clownfish. (2)

3.4.2 Name TWO other symbiotic relationships that occur in species within ecosystems. (2)

3.4.3 From the extract above, give evidence of a:

(a) Poisonous secretion of the sea anemone. (1)

(b) Defence strategy of the clownfish from the sea anemone tentacles. (1)

(c) Blind gut in the sea anemone. (1)

3.4.4 Explain how intraspecific competition in clownfish prevents their population size from exceeding the carrying capacity in the ecosystem. (5)

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TOTAL SECTION B: 100
GRAND TOTAL: 150

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