



LIFE SCIENCE EXAM
NOVEMBER 2021
PAPER 2

GRADE 11

MARKS: 100

TIME: 2 Hours

EXAMINER: Mr Mahabeer

Moderators: Mrs L Prior, Mrs R Harmse

Instructions:

1. Answer ALL the questions
2. Number and answer correctly according to the numbering system used in the question paper.
3. Present your answer according to the instructions of each question.
4. Do ALL drawings in pencil and label them in blue or black ink.
5. Write neatly and legibly

SECTION A

Question 1

- 1.1 Various options are provided as possible answers to the following questions. 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, for example 1.1.11 D.
- 1.1.1 Disease causing agents are called...
- A. Antibiotics
 - B. Vaccines
 - C. Antibodies
 - D. Pathogens
- 1.1.2 A consequence of an increasing human population is that...
- A. Natural gas reserves will increase
 - B. Raw materials will be conserved
 - C. More waste will be produced
 - D. More resources will be saved
- 1.1.3 An organism that carries and transmits pathogenic microorganisms from one host to another.
- A. Virus
 - B. Fungus
 - C. Bacteria
 - D. Vector
- 1.1.4 Ringworms and athlete's foot are caused by...
- A. Bacteria
 - B. Fungi
 - C. Viruses
 - D. Algae
- 1.1.5 Hydra can be described as...
- A. Diploblastic
 - B. Coelomate
 - C. Bilaterally symmetrical
 - D. Triploblastic

- 1.1.6 All mammals are...
- A. Dorsoventrally flattened
 - B. Diploblastic
 - C. Radially symmetrical
 - D. Acoelomate
- 1.1.7 The most abundant greenhouse gases found in the atmosphere.
- A. CFC's and nitrous oxide
 - B. Carbon dioxide and methane
 - C. Nitrous oxide and methane
 - D. Methane and CFC's
- 1.1.8 Which of the following is not an effect of global warming?
- A. Melting of polar ice caps
 - B. Desertification
 - C. Reduced biodiversity
 - D. Increased food production
- 1.1.9 Which of the following is a density- independent factor that regulates population growth?
- A. Disease
 - B. Drought
 - C. Predation
 - D. Lack of space
- 1.1.10 Which of the following about predation is correct?
- A. Predation is interspecific competition
 - B. Predation is a density -independent factor
 - C. The ratio of predator to prey fluctuates with time
 - D. All carnivores are predators

[10X 1 = 10]

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) in the ANSWER BOOK.

1.2.1 Measurement of the total number of carbon dioxide emissions of an individual per year.

1.2.2 Type of reproduction in which a bacterial cell splits into two as in mitosis.

1.2.3 An organism that hunts, catches, and kills its prey.

1.2.4 The permanent movement of organisms out of a specific area.

1.2.5 An organism that acts as a vector in the transmission of malaria.

1.2.6 Medication used for the treatment of bacterial disease.

1.2.7 The death of individuals in a population.

1.2.8 The total count of all individuals in a population.

1.2.9 Cultivation of plants of a single species.

1.2.10 Entry of sewage and fertilizers into water, causing a massive growth of algae.

[10 X 1 = 10]

1.3 Indicate whether each of the statements in COLUMN A applies to **A only**, **B only**, **both A and B** or **None** of the items in COLUMN B. Write **A only**, **B only**, **both A and B** or **None** next to the question number (1.3.1 – 1.3.10) in the ANSWER BOOK.

| COLUMN I | COLUMN II |
|---|--|
| 1.3.1 Reduces greenhouse gases in the atmosphere. | A. Landfill sites B. Deforestation |
| 1.3.2 Decrease biodiversity. | A. Alien plant invasion B. Urbanisation |
| 1.3.3 Triploblastic animals with a blind gut. | A. Platyhelminthes B. Annelida |
| 1.3.4 Simple sampling. | A. Indirect technique B. Direct technique |
| 1.3.5 A relationship between two organisms that live together for the benefit of one. | A. Commensalism B. Mutualism |
| 1.3.6 All viruses. | A. Feed and respire B. Contain nucleic acid |
| 1.3.7 Body wall consisting of three germ layers. | A. Triploblastic B. Diploblastic |
| 1.3.8 Blood system on which the blood is always confined to the blood vessel. | A. Open blood system B. Closed blood system |
| 1.3.9 Illegal removal of organisms from their habitat | A. Commensalism B. Parasitism |
| 1.3.10 The variety of plant and animal species on earth | A. Biodiversity B. Resource partitioning |

[10 x 1 =10]

1.4 Draw a fully labelled diagram of a Rhizopus (bread mould) (5)

TOTAL = 35

SECTION B

Question 2

2.1 Study the diagram showing two microorganisms and answer the questions that follow.

DIAGRAM 1

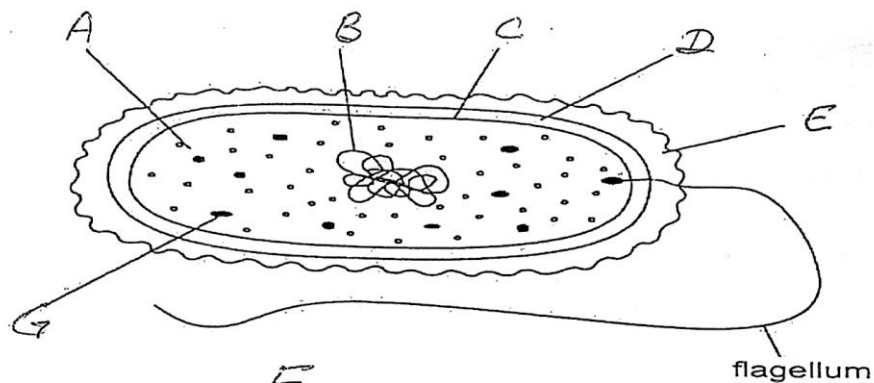
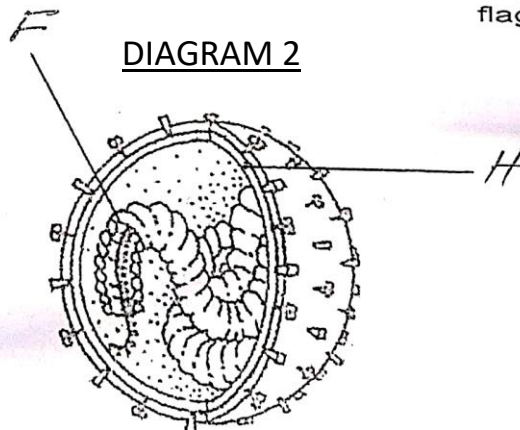


DIAGRAM 2



2.1.1 Write the LETTER only of the part representing the:

2.1.1.1 DNA material (1)

2.1.1.2 Protein coat (1)

2.1.2 Explain the role played by part F in the reproduction of the organism in diagram 2. (2)

2.1.3 State the type of reproduction that takes place in the organism in diagram 1. (1)

2.1.4 List TWO ways in which the organism in diagram 2 differs from living cells. (2)

2.1.5 Which diagram (1 or 2) shows an organism that could cause tuberculosis? (1)

2.1.6 Name the type of medication that is used to destroy organisms represented by diagram 1 in the human body. (1)

[9]

2.2 The table below contains information on changes that occur in a river, downstream from a sewage outflow.

| Distance downstream from the point of entry of sewage (m) | Concentration of dissolved oxygen (%) | Number (Arbitrary units) | | |
|---|---------------------------------------|--------------------------|-------|------|
| | | Bacteria | Algae | Fish |
| 0 | 95 | 88 | 20 | 20 |
| 100 | 30 | 79 | 8 | 6 |
| 200 | 20 | 74 | 7 | 1 |
| 300 | 28 | 60 | 21 | 0 |
| 400 | 42 | 51 | 40 | 0 |
| 500 | 58 | 48 | 70 | 0 |
| 600 | 70 | 44 | 83 | 0 |
| 700 | 80 | 42 | 90 | 0 |
| 800 | 89 | 39 | 84 | 0 |
| 900 | 95 | 36 | 68 | 4 |
| 1000 | 100 | 35 | 55 | 20 |

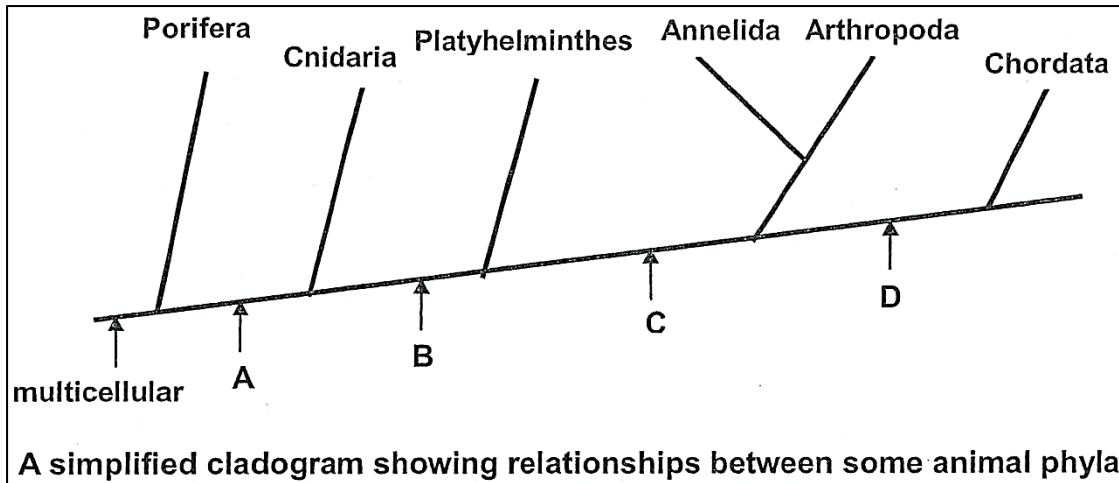
2.2.1 Explain why the number of bacteria was the highest at 0 meters. (1)

2.2.2 Describe the changes in the concentration of oxygen dissolved in the water downstream from the point of sewage entry. (2)

2.2.3 State TWO ways in which the degree of water pollution caused by sewage can be reduced. (2)

[5]

2.3 The diagram below represents a cladogram (phylogenetic tree) showing relationships between animal phyla. The letters (A to D) indicate the characteristics shared by the different phyla of animals which follow the letter. The point where various phyla differ from each other is indicated by the branching-off / split into new phyla.



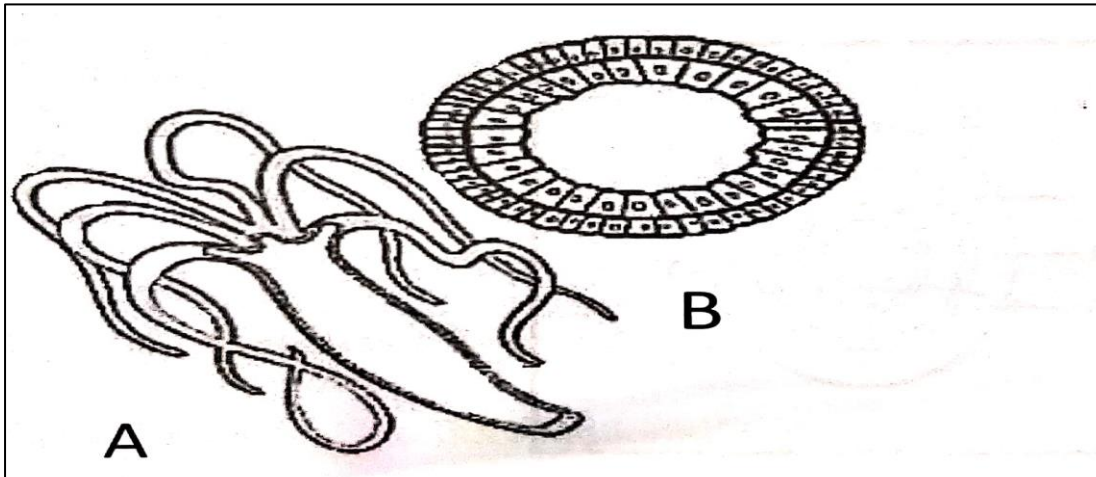
2.3.1. Which characteristic is shared by all the organisms in the animal kingdom according to the cladogram? (1)

2.3.2. Which letter represents each of the following characteristics with respect to the **BODY PLAN**:

- a) Cephalisation (1)
- b) Triploblasty (1)
- c) Coelom (1)
- d) Bilateral symmetry (1)
- e) Segmentation (1)

2.3.3. Discuss **ONE** similarity and **TWO** differences between the phyla Cnidaria and Platyhelminthes. (6)

2.4 Diagram A shows a complete animal while diagram B shows a cross section through the body of the same animal.



2.4.1 Identify the phylum to which this organism belongs. (1)

2.4.2 What type of gut does this organism have? (1)

2.4.3 Explain ONE disadvantage of the type of gut named in Question 2.4.2 above. (1)

2.4.4 Explain ONE importance of the development of a coelom. (1)

[4]

TOTAL = 30

Question 3

- 3.1 Farmers often add chemical fertilisers to their land to increase the yield of their crops. Sometimes they over-use chemical fertilisers which could lead to soil pollution.

The table below shows how the addition of a phosphate fertiliser to land on which crops of potatoes and barley are grown, affected their land.

The yield is the amount of food harvested from the crop.

| Amount of phosphate fertiliser added to soil (kg/hectare) | Yield of potato crop (ton/hectare) | Yield of barley crop (ton/hectare) |
|--|---|---|
| 0 | 13 | 2 |
| 4 | 18 | 4 |
| 8 | 22 | 6 |
| 12 | 26 | 8 |
| 16 | 28 | 8 |
| 20 | 28 | 8 |

- 3.1.1 Plot TWO line graphs on the same system of axes to illustrate how the addition of fertiliser influenced the yield of the two crops. (6)
- 3.1.2 What is the minimum amount of fertiliser that had to be added to the barley crop to achieve the maximum yield? (1)
- 3.1.3 State TWO disadvantages of adding more than 16 kg/hectare phosphate fertiliser to the soil. (2)

[9]

- 3.2 Two students decided to investigate the effect of different concentrations of sulphur dioxide on the germination of oats seeds. They set up trays of germinating seeds under a clear plastic cover along with five different concentrations of sodium disulphate (IV) solution.

Sodium disulphate (IV) breaks down to release sulphur dioxide into the atmosphere.

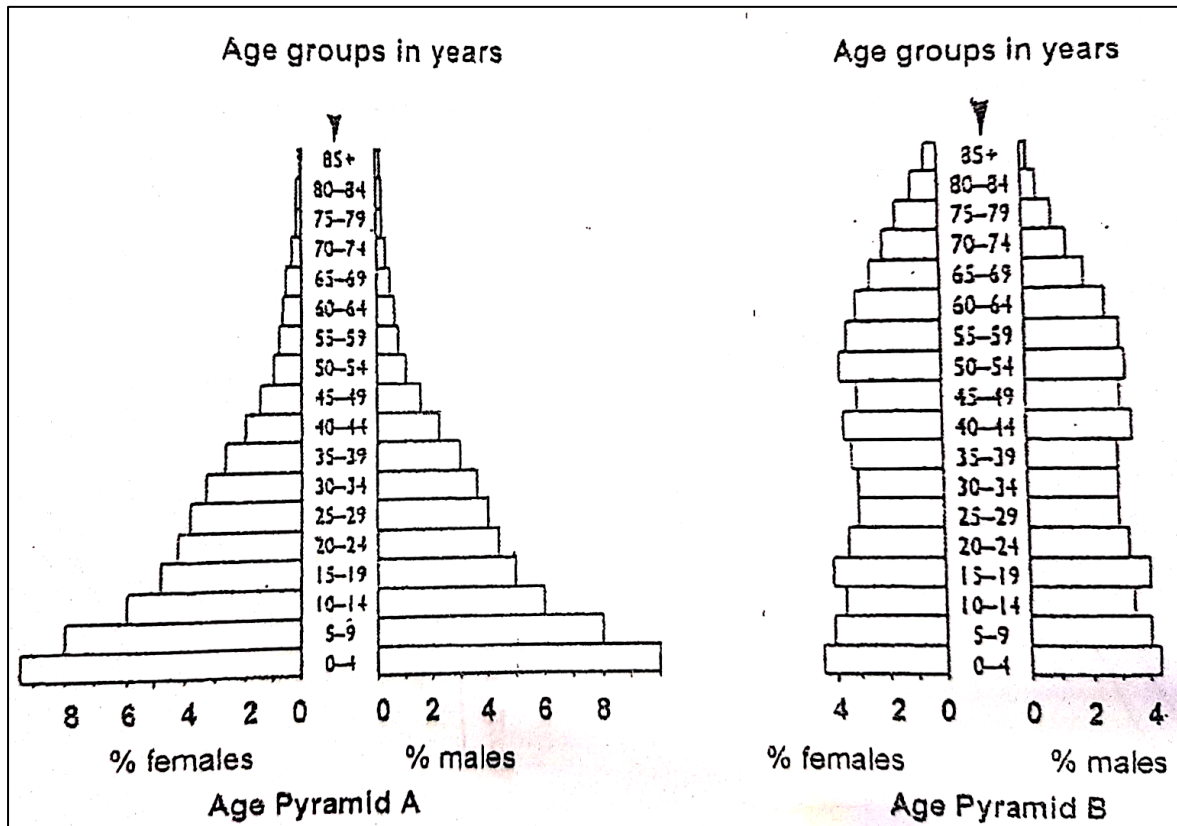
The table below shows the results after one week.

| Concentration of sodium disulphate (IV) (%) | Number of seeds germinated out of 20 (five replications) | | | | | Percentage germination |
|---|--|----|----|----|----|------------------------|
| 0.0 | 19 | 19 | 17 | 20 | 18 | 93 |
| 0.05 | 16 | 17 | 15 | 15 | 17 | 80 |
| 0.10 | 12 | 13 | 14 | 11 | 12 | |
| 0.50 | 0 | 1 | 0 | 0 | 1 | 2 |
| 2.50 | 0 | 0 | 0 | 0 | 0 | 0 |

- 3.2.1 Formulate a possible hypothesis for this investigation. (1)
- 3.2.2 State the independent variable in this investigation. (1)
- 3.2.3 Name TWO factors which might affect seed germination, and which must be kept constant. (2)
- 3.2.3 Why was the investigation repeated five times at each concentration? (2)
- 3.2.4 Calculate the percentage of germination using a 0.10 % concentration of sodium disulphate (IV). (2)
- 3.2.5 What evidence from the results in the table below shows that sodium disulphate (IV) does affect the germination of oats seeds? (1)

[9]

3.3 The diagram below represents the age distribution of the human population of a developed country and a developing country in one year at a certain time.



3.3.1 What percentage of the female population is aged between 5 and 9 years in pyramid A? (1)

3.3.2 Which age group makes up exactly 5 % of the male population in pyramid A? (1)

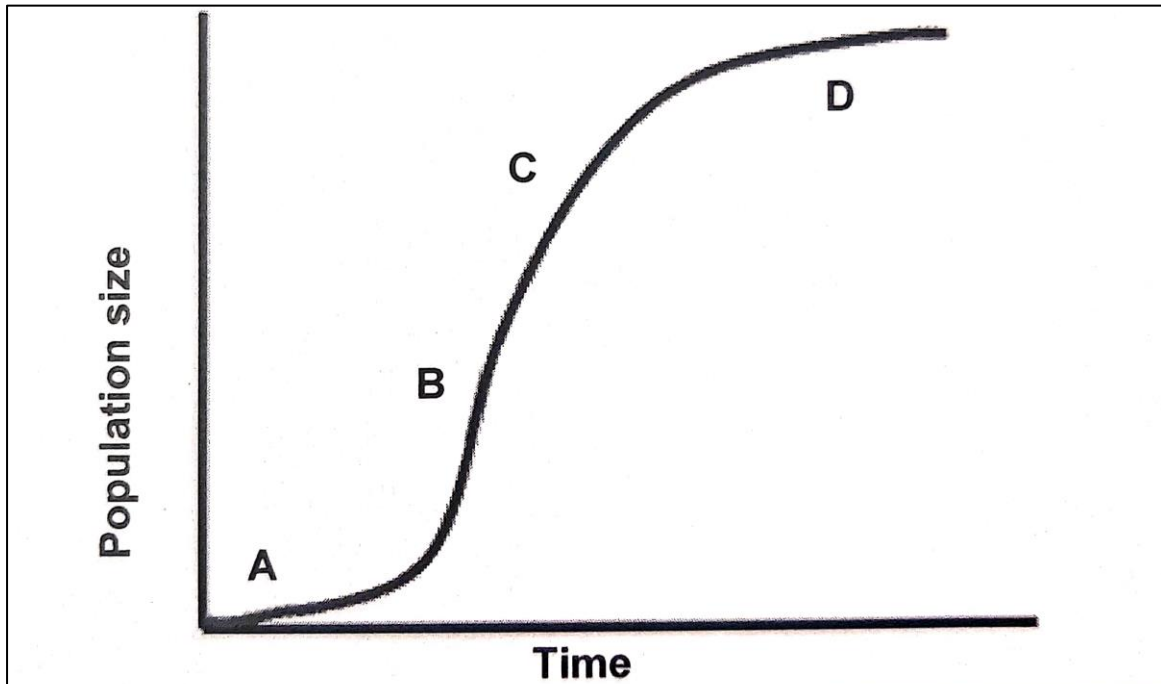
3.3.3 What percentage of the female population are aged 65 to 69 years in pyramid B? (1)

3.3.4 What group (male or female) has the larger percentage reaching old age in pyramid B? (1)

3.3.5 Which pyramid represents the population distribution of a developed country? (1)

3.3.6 Give TWO reasons for your answer to QUESTION 3.3.5. (2)

3.4 The graph below shows the population growth of a colony of bacteria.



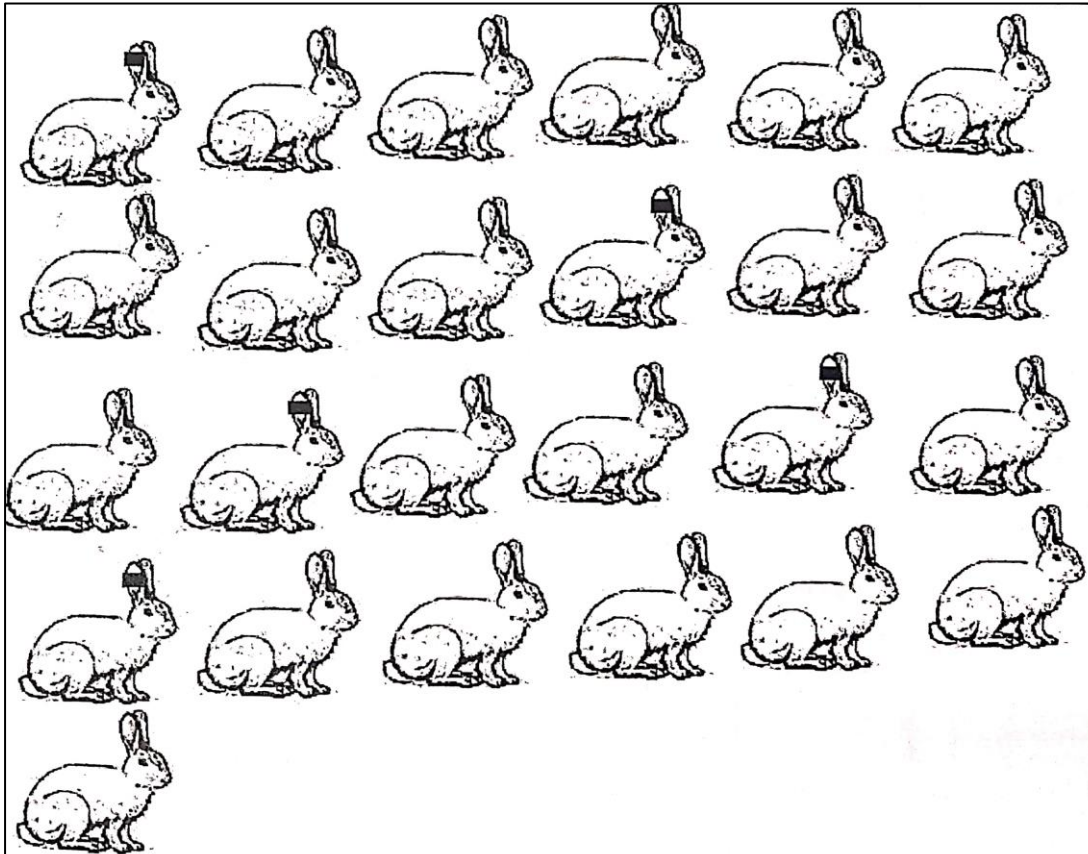
3.4.1 What type of growth curve is shown in the graph? (1)

3.4.2 Which phase (**A**, **B**, **C** or **D**) has the following characteristics?

- a) Population growth slows down (1)
- b) The population grows slowly because of the new environment (1)
- c) The phase where environmental resistance starts to increase (1)
- d) The phase where growth takes place rapidly because there are no limiting factors. (1)

[5]

3.5 In an attempt to determine the size of a rabbit population, 15 rabbits were caught, and tags were attached to their ears. Two weeks later, a sample of 25 rabbits were re-captured from the same area. The diagram below shows the rabbits that were re-captured. Study the diagram below and answer the following questions.



3.5.1 Calculate the size of rabbit population in the area. Show all working. (2)

This formula may assist you in your calculation.

$$P = \frac{F \times S}{M}$$

Where;

F = Number caught in first sample

S = Number caught in second sample

M = Number marked in second sample

3.5.2 Suggest the reason why the estimated size of the population may differ from the real population size. (1)

3.5.3 State TWO ways in which the reliability of this method can be improved.

(2)

[5]

TOTAL = 35