education

Lefapha la Thuto la Bokone Bophirima
Noord-Wes Departement van Onderwys
North West Department of Education
NORTH WEST PROVINCE

# PROVINCIAL ASSESSMENT

## GRADE 11

## LIFE SCIENCES P1

## NOVEMBER 2019

**MARKS: 150**

**TIME: 2½ 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. Do 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.

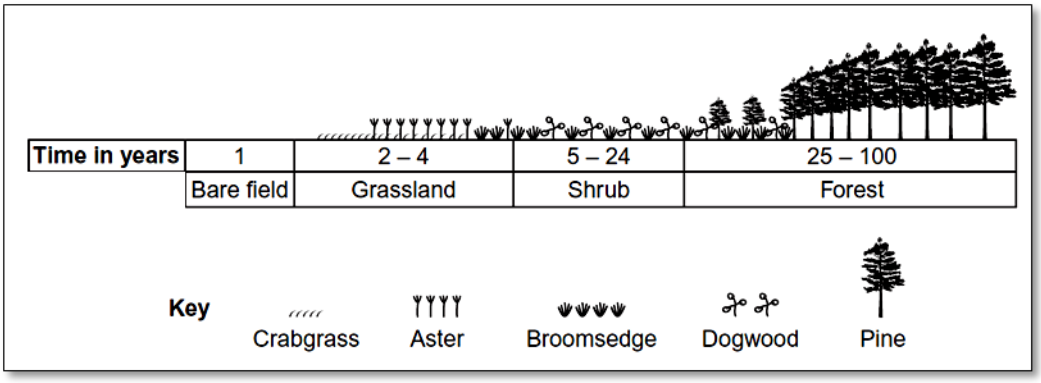
 

## SECTION A

## QUESTION 1

1.1 Various options are 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 1.1.9) in the ANSWER BOOK, e.g. 1.1.10 C.

1.1.1 The diagram below shows the dominant plants in communities formed during succession from bare soil to pine forest.




Name the pioneer species shown in the diagram.

A Dogwood
B Crabgrass
C Pine
D Aster

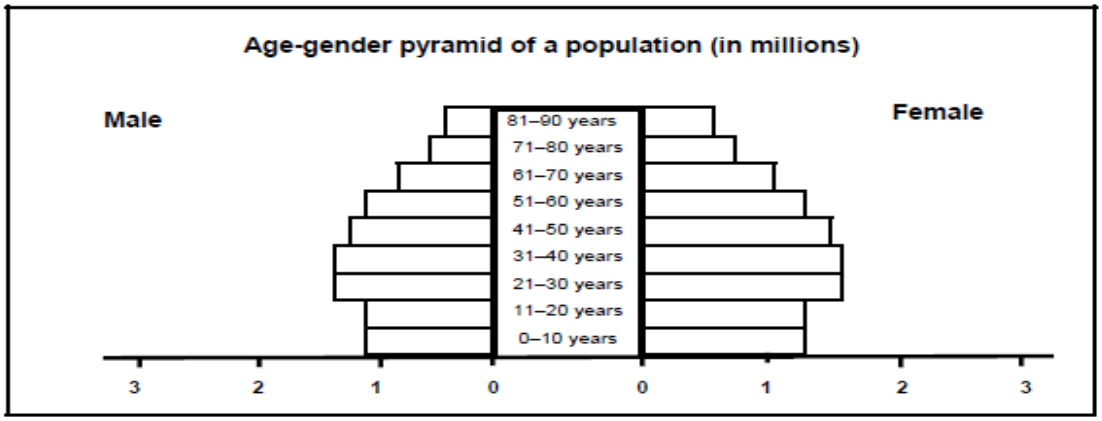
1.1.2 Epiphytic orchids have a symbiotic relationship with trees in forests. How is this an example of commensalism?

A The epiphyte is parasitic on the tree
B The epiphyte harms the tree by inserting its roots into the tree and taking up water from the tree's xylem
C The epiphyte benefits by being supported by the branches of a tree so that it can get enough sunlight, while the tree neither benefits nor is harmed
D The tree gains extra photosynthetic leaves from the orchid and so benefits from the relationship

1.1.3 Which statement best describes the relationship between a parasite and its host?

A The host is harmed while the parasite benefits
B The parasite is harmed while the host benefits
C Both host and parasite benefit
D The parasite benefits and the host is not affected at all

1.1.4 The age-gender pyramid shown below is for a developed country since…




A the life expectancy of the population is high.
B there are more young people than old people.
C there are more females than males in each age group.
D the number of newborn is high.

1.1.5 The significance of photosynthesis to living organisms is the production of …

A $H_2O$ and glucose.
B $CO_2$ and $H_2O$.
C Glucose and starch.
D $O_2$ and glucose.

1.1.6 Why can the relationship between nitrogen fixing bacteria and leguminous plants be considered as a case of mutualism?

A The bacteria and the plants cannot survive without each other
B One organism is harmed in this relationship
C Both organisms benefit in this relationship
D Two organisms are living together in close association

1.1.7 Which of the following shows the correct path of air movement during exhalation?

A Bronchiole → bronchus → alveolus → trachea
B Alveolus → bronchiole → bronchus → trachea
C Trachea → bronchus → bronchiole → alveolus
D Alveolus → bronchus → bronchiole → trachea

1.1.8 In humans gas exchange occurs in the …

A alveoli.
B diaphragm.
C bronchi.
D trachea.

1.1.9 The stomach is protected against bacterial invasion by …

A white blood cell.
B enzymes.
C mucus.
D hydrochloric acid. (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 number (1.2.1 to 1.2.7) in the ANSWER BOOK.

1.2.1 The excretion of undigested and indigestible material out of the body through the anus

1.2.2 Temporary movement of organisms into or out of an area due to seasonal changes in resources

1.2.3 The organelle in which cellular respiration occurs

1.2.4 A chronic medical disorder of the lungs in which the air sacs are dilated or enlarged and lack flexibility

1.2.5 The functional role and position of a species within a community or ecosystem

1.2.6 Inorganic compound acting as an energy carrier in cells

1.2.7 Interaction and pattern of behavior shown by organisms in a social group (7 x 1) **(7)**

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 1.3.7) in the ANSWER BOOK.

| COLUMN I | COLUMN II |
|---|---|
| 1.3.1 Different organisms occupying the same habitat | A: Population<br>B: Community |
| 1.3.2 Breathing muscles | A: Diaphragm muscle<br>B: Intercostal muscles |
| 1.3.3 Site where light-independent reactions take place during photosynthesis | A: Stroma<br>B: Thylakoid |
| 1.3.4 All the substances in the blood, except blood corpuscles and proteins, that moves into the capsular space in the nephron | A: Tubular reabsorption<br>B: Glomerular filtration |
| 1.3.5 The series of changes in an ecosystem from bare rock to a forest | A: Succession<br>B: Resource partitioning |
| 1.3.6 The type of symbiotic relationship displayed by *E. Coli* living in the human intestines | A: Parasitism<br>B: Commensalism |
| 1.3.7 Homeostasis of blood glucose | A: Glucagon<br>B: Insulin |

(7 x 2**)** **(14)**

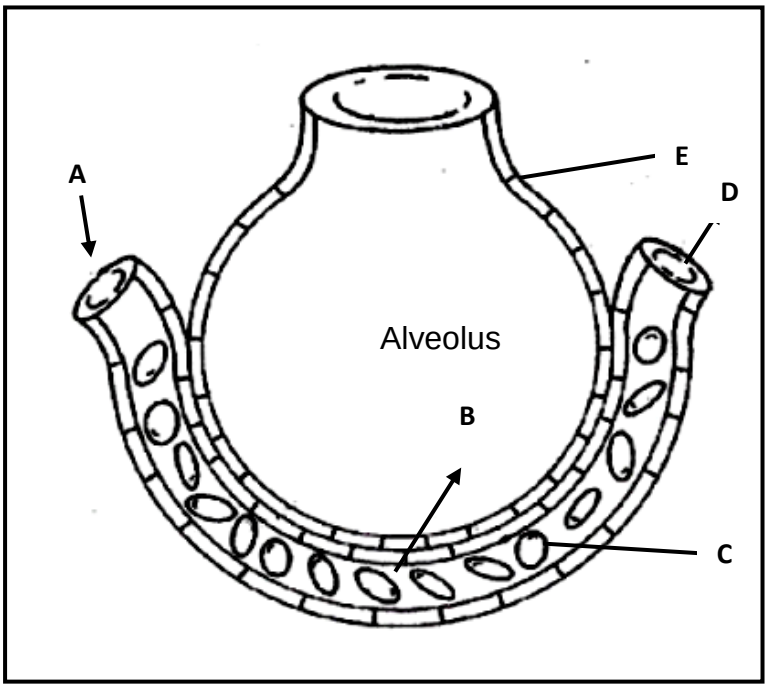
 

1.4 Complete the table below by writing either **'high'** or **'low'** in the ANSWER BOOK. Write only the word (High or Low) next to the question numbers (1.4.1 to 1.4.6) in the ANSWER BOOK, e.g. 1.4.7 High.

| **Substances** | **Hepatic vein** | **Hepatic artery** |
|---|---|---|
| Glucose | 1.4.1 | 1.4.2 |
| Oxygen | 1.4.3 | 1.4.4 |
| Vitamins | 1.4.5 | 1.4.6 |

**(6)**

1.5 The diagram below represents an alveolus and its blood capillary.




Indicate the letter on the diagram which represents each of the following. Write only the letter (A to E) next to the question number (1.5.1 to 1.5.5) in the ANSWER BOOK, for example 1.5.6 H.

1.5.1 Red blood corpuscles (1)

1.5.2 Squamous epithelial cells of the alveolus (1)

1.5.3 The direction in which most carbon dioxide will move between the alveolus and blood capillary (1)

1.5.4 The part with the highest oxygen concentration in the blood capillary (1)

1.5.5 The part with the highest carbon dioxide concentration in the blood capillary (1)

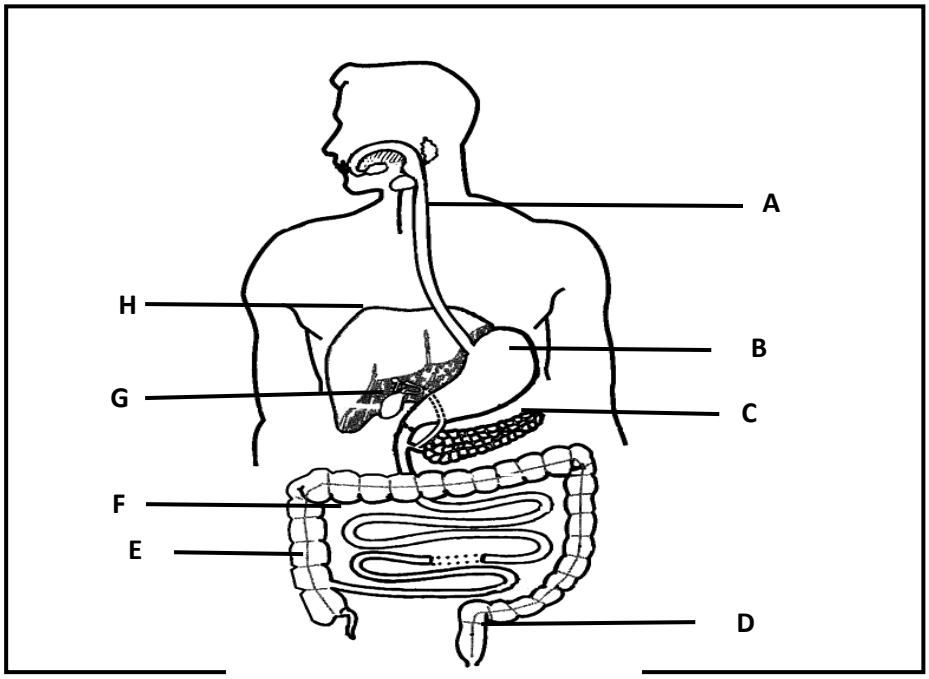
**(5)**

**TOTAL SECTION A: 50**

## SECTION B

## QUESTION 2

2.1 The diagram below shows the human digestive system.




2.1.1 Identify parts **A**, **C** and **D**. (3)

2.1.2 Give only the LETTER of the part:

(a) That stores bile (1)

(b) Where chemical digestion of protein begins (1)

(c) Where most water and mineral salts are absorbed (1)

(d) That deaminates excess amino acids into urea (1)

2.1.3 Mention FOUR reasons why people should take dietary supplements. (4)
**(11)**

2.2 Study the diagram shown below and answer the questions that follow.

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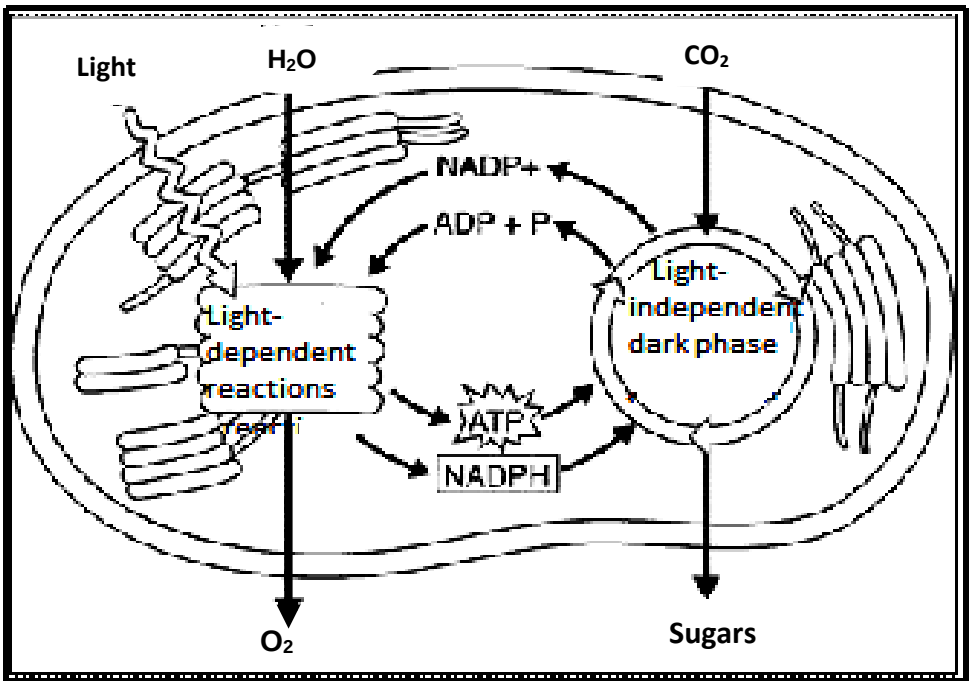



2.2.1 Identify the organelle shown in the diagram. (1)

2.2.2 Mention TWO ways in which the organelle identified in QUESTION 2.2.1 is structurally adapted for its function. (2)

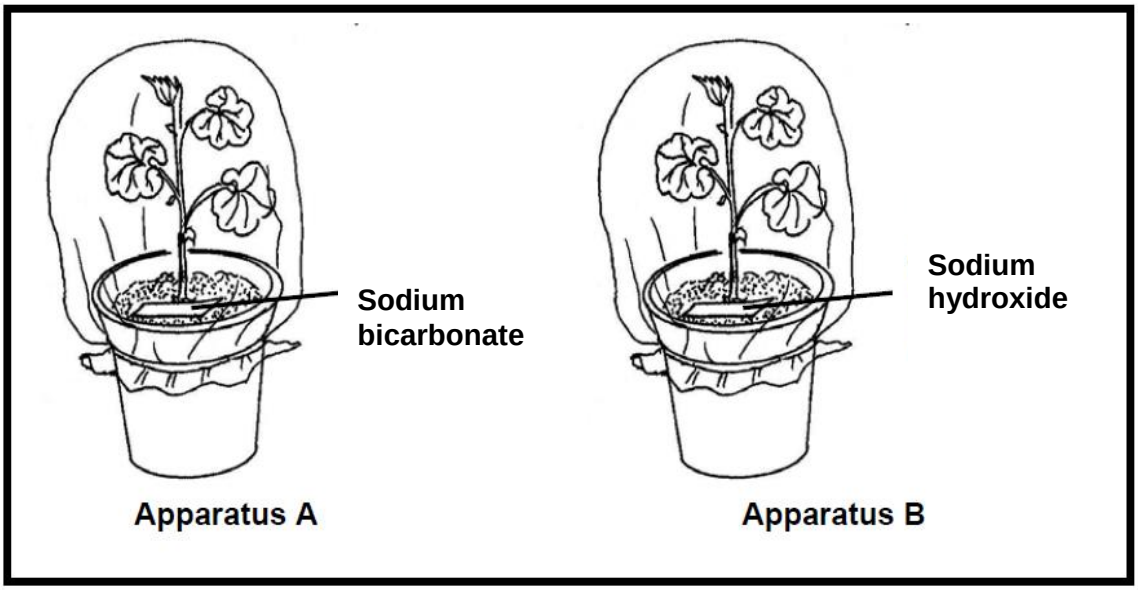
2.2.3 Name TWO energy products of the light-dependent reactions. (2)

2.2.4 Discuss the ecological importance of the dark phase. (4)
**(9)**

2.3 A group of grade 11 learners wanted to investigate whether carbon dioxide is necessary for photosynthesis. They followed the following procedures:

- Two potted, destarched geranium plants were well watered and placed on a brightly lit window sill.
- A dish of sodium bicarbonate was placed beside the plant in apparatus **A**, while a dish of sodium hydroxide was placed beside the plant in apparatus **B**.
- Each plant was covered with a transparent plastic bag as shown in the diagram below.

Study the diagram and answer the questions that follow:




2.3.1 Why were the plants left on a brightly lit window sill? (2)

2.3.2 After 48 hours a leaf from each plant, **A** and **B**, were tested for the presence of starch. Describe the procedure they used to test for the presence of starch in the leaves. (5)

2.3.3 In which plant (**A** or **B**) would:

(a) The leaves remain brown after the starch test (1)

(b) There be a higher concentration of oxygen in the plastic bag (1)

2.3.4 Give ONE reason for your answer to QUESTION 2.3.3 (b). (1)

2.3.5 State the independent variable for apparatus **A**. (1)

2.3.6 State ONE way how the learners could ensure that their results were reliable. (1)

2.3.7 Describe the function of the sodium bicarbonate. (2)
**(14)**

2.4 Read the following passage and then answer the questions.

**Cellular respiration**

Adenosine triphosphate (ATP) is the immediate source of energy used by muscles. When glucose is broken down during cellular respiration to release energy, this energy is transferred to ATP molecules.

The first step in the breakdown of glucose molecules takes place in the absence of oxygen. This is known as the anaerobic phase. One of the substances produced here is lactic acid which accumulates in the muscle cells.

If plenty of oxygen is available then aerobic respiration takes place. This results in the formation of carbon dioxide and water instead of lactic acid.

2.4.1 Name:

(a) The organic compound needed for cellular respiration (1)

(b) TWO products of aerobic respiration (2)

2.4.2 State the circumstances under which aerobic respiration and anaerobic respiration take place. (2)

2.4.3 This type of biochemical process also occurs in plants. What products are produced in plant tissue? Name ONE. (1)

**(6)**

**[40]**

## QUESTION 3

3.1

Khayelitsha was home to over half a million people in 2007. This area lies on the outskirts of Cape Town. Water comes from shared taps, as one in three people have no access to water at his or her home. The population is growing by 48 000 people every year. The area is divided into regions called Site A, Site B and Site C. Research in Site B and C shows that there is one toilet for every 105 people. The table below lists the top four causes of death for children under the age of one in the area. Note that diarrhoea did not feature as a cause of death in any of the middle-class or upper class suburbs of Cape Town.

The table shows the top four causes of death among children under one years old in 2008 and 2010 in Khayelitsha.

| **Category** | **2008** | **2010** |
|---|---|---|
| Diarrhoea and gastro-enteritis | 19,2% | 21,3% |
| HIV/AIDS | 11,7% | 16,1% |
| Pneumonia | 9,2% | 6,6% |
| TB | 8,9% | 13,3% |

3.1.1 Draw a bar graph of the data provided in the table. (6)

3.1.2 Which positive trend took place between 2008 and 2010 (according to the data)? (2)

3.1.3 Explain the link between HIV/AIDS and TB as suggested in this data. (2)

3.1.4 In what scientific way could this data have been collected? (1)
**(11)**

3.2 Tabulate TWO differences between developed and developing countries. **(5)**

3.3 Study the table below that shows the lactic acid concentration in the blood of an athlete.

The lactic acid concentration in the blood of the athlete was measured at 10 minute intervals before, during and after the race.

| TIME (MINS) | LACTIC ACID CONCENTRATION ARBITRARY UNITS) |
|---|---|
| 0 | 19 |
| 10 | 19 |
| 20 | 40 |
| 30 | 90 |
| 40 | 45 |
| 50 | 22 |
| 60 | 19 |

3.3.1 What is the 'normal' lactic acid concentration in the blood? (1)

3.3.2 Identify the:

(a) Independent variable (1)

(b) Dependent variable (1)

3.3.3 Explain why the lactic acid concentration of the blood increased at the end of the race. (2)

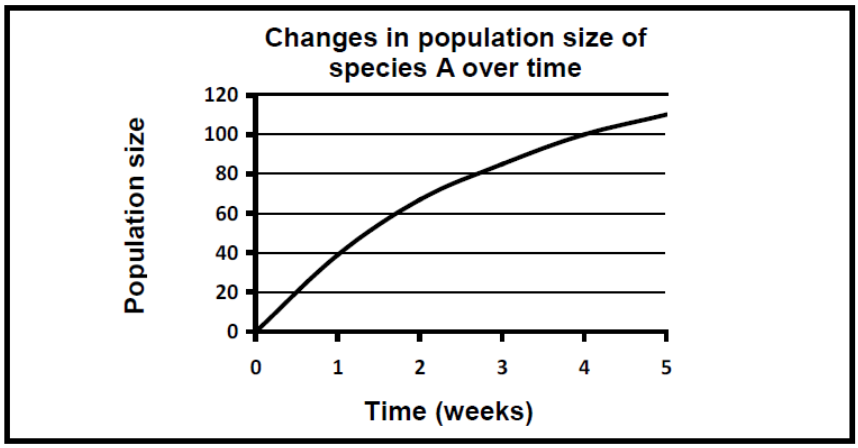
3.3.4 How long did it take, at the end of the race for the lactic acids levels to return to normal. Show ALL your workings. (2)
**(7)**

3.4

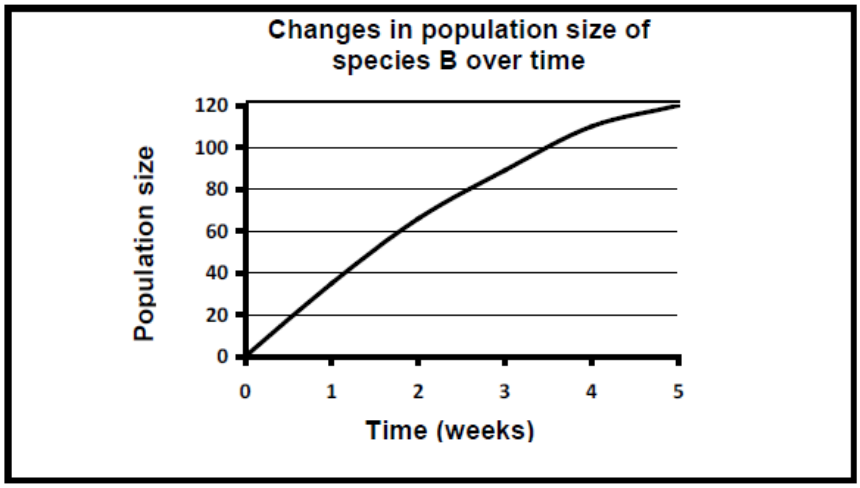
The growth patterns of two closely related species (**A** and **B**) that rely on the same food source were investigated. At first the two species were separated and then the two species were kept in the same habitat for the same period of time. In all cases the organisms were provided with a limited food supply.

The results are shown in the three graphs (**A**, **B** and **C**) below:

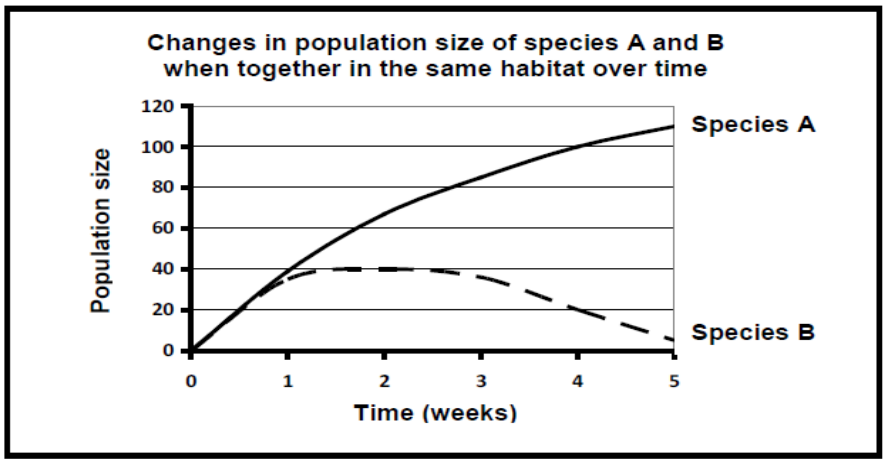
**GRAPH A**




**GRAPH B**




**GRAPH C**




3.4.1 State the type of community interaction illustrated in graph **C**. (1)

3.4.2 Use graphs **A**, **B** and **C** to explain the growth patterns of species **A** and species **B** when separated, compared to the growth patterns of species **A** and **B** together in the same habitat. (6)

3.4.3 Explain how the growth patterns of the two species in graph **C** might change if more food is provided while they are living together in the same habitat. (2)
**(9)**

3.5

A researcher wanted to know how many fish were in a dam. She caught 20 fish and marked them by clipping out a small section of their tail fins. She then released them back into the dam. A few days later she caught 25 fish and found that 8 had been marked. Calculate the size of the fish population. Show ALL your workings.

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

P = Estimated total number of fish in the population.
F = Number caught and marked in the first catch.
S = Number caught in the second catch.
M = Number marked in the second catch. **(3)**

3.6 Describe the homeostatic control that occurs in the body of a normal person to increase blood glucose levels, when they are too low. **(5)**
**[40]**

**TOTAL SECTION B: 80**

## SECTION C

### QUESTION 4

Write an essay to trace the possible path that water molecules may take through the nephrons of a person who is exercising in hot weather.

Start the essay from where the water enters the nephron from the glomerulus and end when some may leave the body as part of the urine.

Discuss also the hormone responsible for controlling how much water is released as part of the urine.

Content: (17)
Synthesis: (3)
**(20)**

**NOTE:** NO marks will be awarded for answers in the form of a table, flow charts or diagrams.

**TOTAL SECTION C: 20**
**GRAND TOTAL: 150**