education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NATIONAL
SENIOR CERTIFICATE

GRADE 11

LIFE SCIENCES P2

EXEMPLAR 2007

MARKS: 150

TIME: 2½ hours

This question paper consists of 19 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 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.   Write neatly and legibly.

6.   If answers are NOT presented according to the instructions of each question, candidates will lose marks.

7.   ALL drawings should be done in pencil and labelled in blue or black ink.

8.   Only draw diagrams or flow charts when requested to do so.

9.   The diagrams in this question paper are NOT necessarily drawn to scale.

10.   The use of graph paper is NOT permitted.

11.   Non-programmable calculators, protractors and compasses may be used.

SECTION A

QUESTION 1

1.1   Various possible options are provided as answers to the following questions. Choose the correct answer and write only the letter (A - D) next to the question number (1.1.1 - 1.1.5) in the answer book, for example 1.1.6   D.

     1.1.1   A group of organisms of the same species, occupying the same habitat at the same time is called ...

         A   a community.
         B   an ecosystem.
         C   a population.
         D   a niche.

     1.1.2   An example of positive human influence on the environment is …

         A   conservation.
         B   pollution.
         C   overpopulation.
         D   deforestation.

     1.1.3   Adding harmful substances to the environment is termed …

         A   exploitation.
         B   forestation.
         C   pollution.
         D   detoxification.

     1.1.4   The greenhouse effect causes the atmosphere to …

         A   cool down.
         B   form smog.
         C   darken.
         D   heat up.

     1.1.5   The phase in the logistic growth curve when organisms take time to settle in and acclimatise to the area is called the …

         A   equilibrium phase.
         B   lag phase.
         C   accelerating growth phase.
         D   log phase.   (5 x 2)   (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 - 1.2.9) in the answer book.

      1.2.1   The balance between human development and conservation of the environment

      1.2.2   A pollutant that causes global warming

      1.2.3   A hazy mixture of fog and smoke

      1.2.4   Chemicals used as pesticides to kill insects

      1.2.5   The replanting of trees and shrubs in a forest

      1.2.6   When organisms move periodically from one area to another

      1.2.7   A direct count of every individual in a population

      1.2.8   Wild species which are facing a very high risk of extinction

      1.2.9   The list that contains the names of species threatened with extinction   (9)

1.3   Choose an item/word from COLUMN B that matches a description in COLUMN A. Write only the letter (A - L) next to the question number (1.3.1 - 1.3.7) in the answer book, for example 1.3.8   N.

COLUMN A		COLUMN B	
1.3.1	Global warming	A	nitrogen oxide
1.3.2	Unwanted, unusable items or by-products and household rubbish	B	epidemic
		C	fecundity
1.3.3	An organism that spreads diseases	D	chemicals
1.3.4	A disease that spreads quickly through a community in a given period of time	E	natality
		F	waste
1.3.5	The average number of children born in one generation per female of child-bearing age	G	rising sea levels
		H	vector
1.3.6	The death of organisms in a population	I	emigration
1.3.7	The movement of individuals into a habitat	J	volcano
		K	mortality
		L	immigration

(7 x 1)   (7)

1.4   Study the diagrams showing food pyramids below and answer the questions that follow:

Number pyramids of two balanced ecosystems
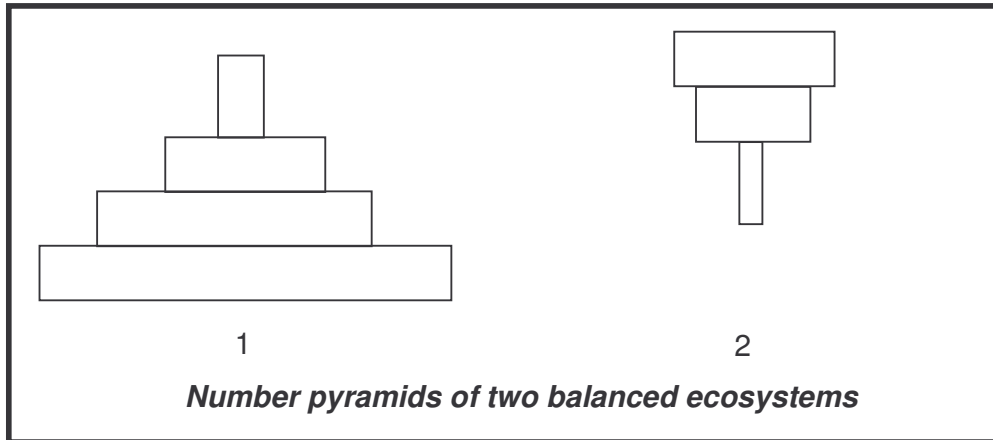
1.4.1   Account for the difference in shape between pyramid 1 and pyramid 2.   (2)

1.4.2   Draw a food chain that represents pyramid 2.   (4)

1.5   Study the table below, which shows the population growth of humans from 1925 to 2013 (projected), and answer the questions that follow:

Year	Estimated population (in millions)
1925	2 000
1975	4 000
2013	8 000

1.5.1   What was the time interval for doubling the world's population from:

(a)   1925 to 1975
(b)   1975 to 2013   (2)

1.5.2   If this trend continues, what can be concluded about the time intervals for the future doubling of the world population?   (1)

1.5.3   How is the human population size determined?   (1)

1.5.4   List TWO factors that could account for an increase in the human population.   (2)

1.5.5   Why would a policy of allowing only one child per family lead to a reduction of the human population size?   (1)

1.6   Study each of the following behavioural examples. Write down the numbers
        1.6.1 to 1.6.5 in your answer book and next to each only the letter (A - E) of
        the appropriate social behaviour selected from the following list:

        A   Reflex/Instinctive
        B   Learned/Conditional/Acquired
        C   Mating/Courtship
        D   Territorial
        E   Competitive/Interspecific competition

        1.6.1   Male peacocks display the large, brightly coloured feathers of their
                    tails.

        1.6.2   A millipede automatically curls up its body into a tight circle when it
                    is touched.

        1.6.3   A hippopotamus deposits a mixture of dung and urine on the edge
                    of its grazing area.

        1.6.4   Vultures and crows feed on the same carcass.

        1.6.5   Goldfish move towards the side and the surface of a fish tank if you
                    move towards it.   (5)

1.7   Study the following graph which indicates the amount of ozone depletion
        of the stratosphere between 1982 and 1996:

Amount of ozone depletion of the stratosphere between 1982 and 1996
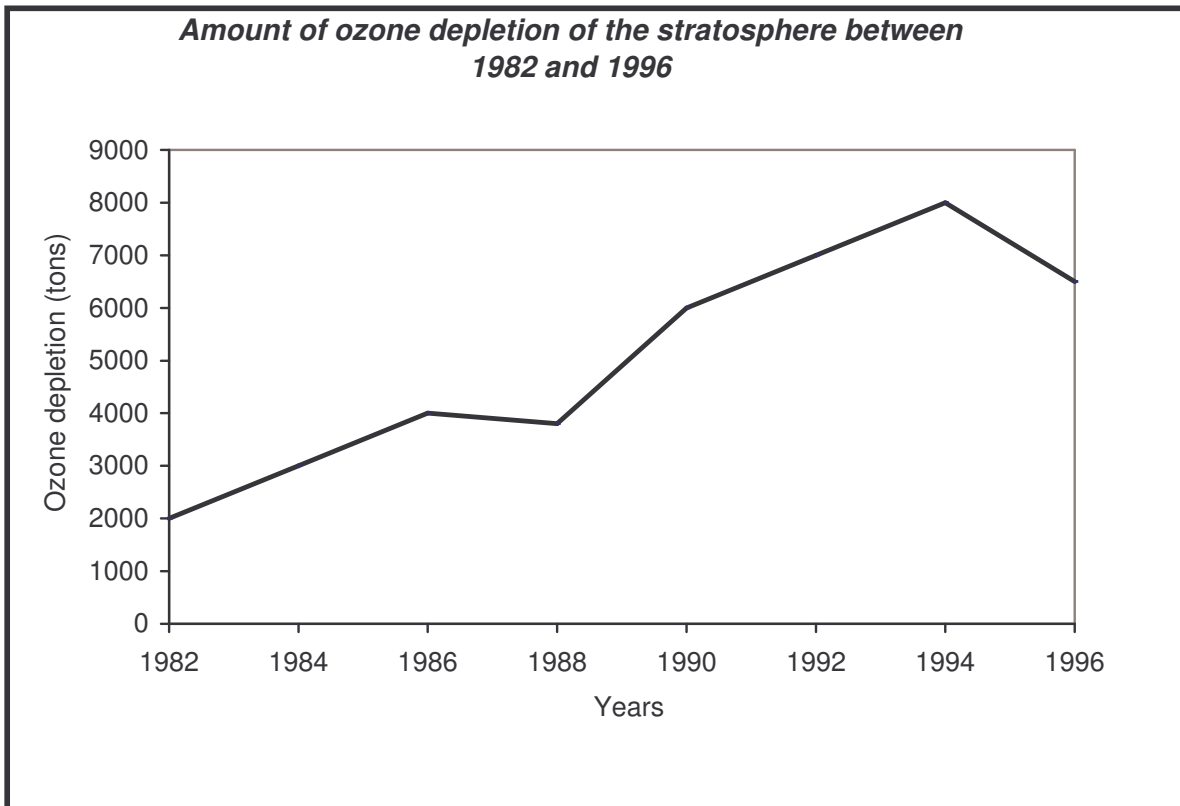
1.7.1   Comment on the ozone depletion during the period 1982 to 1996.   (2)

1.7.2   How much of the ozone was lost from the stratosphere in 1990?   (1)

1.7.3   CFC's can stay around for about 100 years. What is the implication
         of this for the ozone layer?   (1)

1.7.4   Give ONE possible reason for the decrease in ozone depletion after
         1994.   (2)

TOTAL SECTION A: 50

**SECTION B**

QUESTION 2

2.1   Read the following paragraph and answer the questions that follow:

> *Of great concern is the rate at which deforestation is occurring worldwide. Currently 12 million hectares of forests are cleared annually. Almost all of this deforestation occurs in the moist forests and open woodlands of the tropics. At this rate all moist tropical forests could be lost by the year 2050, except for isolated areas in Amazon, the Zaire basin, as well as a few protected areas within reserves and parks.*
>
> [Extracted from: *Enviro Facts Sheet 19*]

2.1.1   Explain how the removal of plants by deforestation contributes to an increase in the concentration of greenhouse gases.   (4)

2.1.2   Explain how deforestation increases soil erosion.   (4)

2.1.3   Explain how deforestation affects the water cycle.   (4)

2.2 The map below shows a region of coastline close to where a giant oil tanker was wrecked at sea. The shallow waters of the coastline provided a rich source of edible crabs. Oil does not kill the crabs but harm their flesh, making them inedible and they cannot be sold. Samples of crabs were collected at sites A to D. The number of crabs is indicated by the size of the circle. The extent of the shaded part at each site represents the proportion of crabs with diseased flesh after the disaster.

Map of coastline where an oil tanker was wrecked at sea
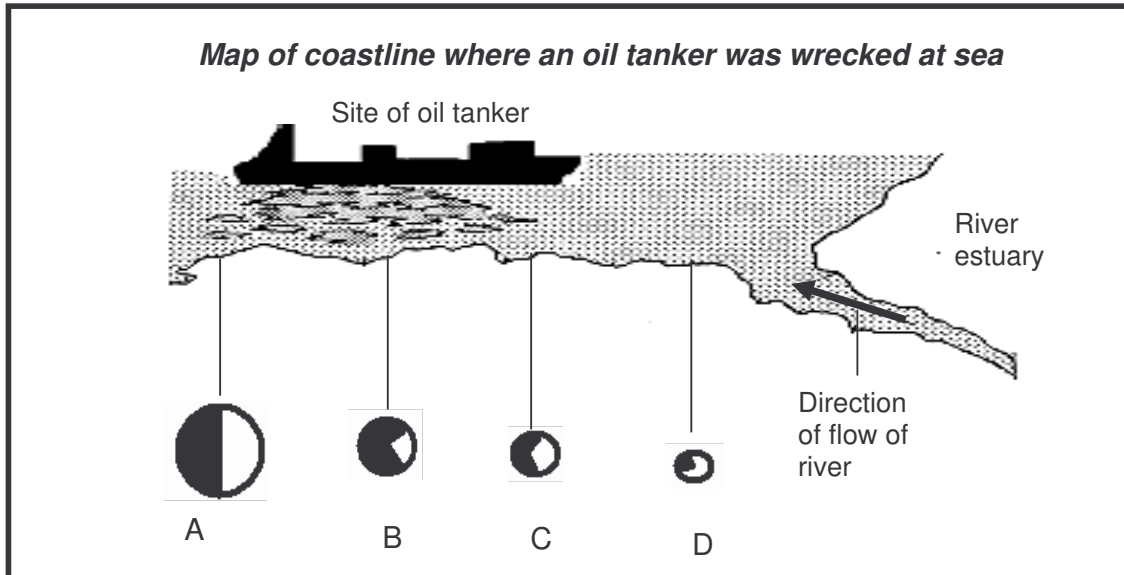
2.2.1   Which sample site (A to D) had the highest number of crabs?   (1)

2.2.2   In which sample site was the crabs only rarely found?   (1)

2.2.3   Name the agent of pollution that affected the crabs.   (1)

2.2.4   In which sample site was the most crabs affected compared to the population size?   (1)

2.2.5   Explain your answer to QUESTION 2.2.4.   (2)

2.2.6   List TWO strategies that could reduce the effects of oil pollution at sea.   (2)

2.3   The apparatus shows a method used to investigate the effect of sulphur
        dioxide (SO_2) gas on the growth of young roots.
        Each of three gas jars contained a germinating bean seed placed on graph
        paper, as indicated in the diagram below. Using a SO_2 siphon, SO_2 bubbles
        were passed through. Each jar was sealed with a cover glass. A different
   number of SO_2 bubbles were passed into each of the three gas jars.

Experiment to indicate the effect of sulphur dioxide (SO_2)
gas on the growth of young roots
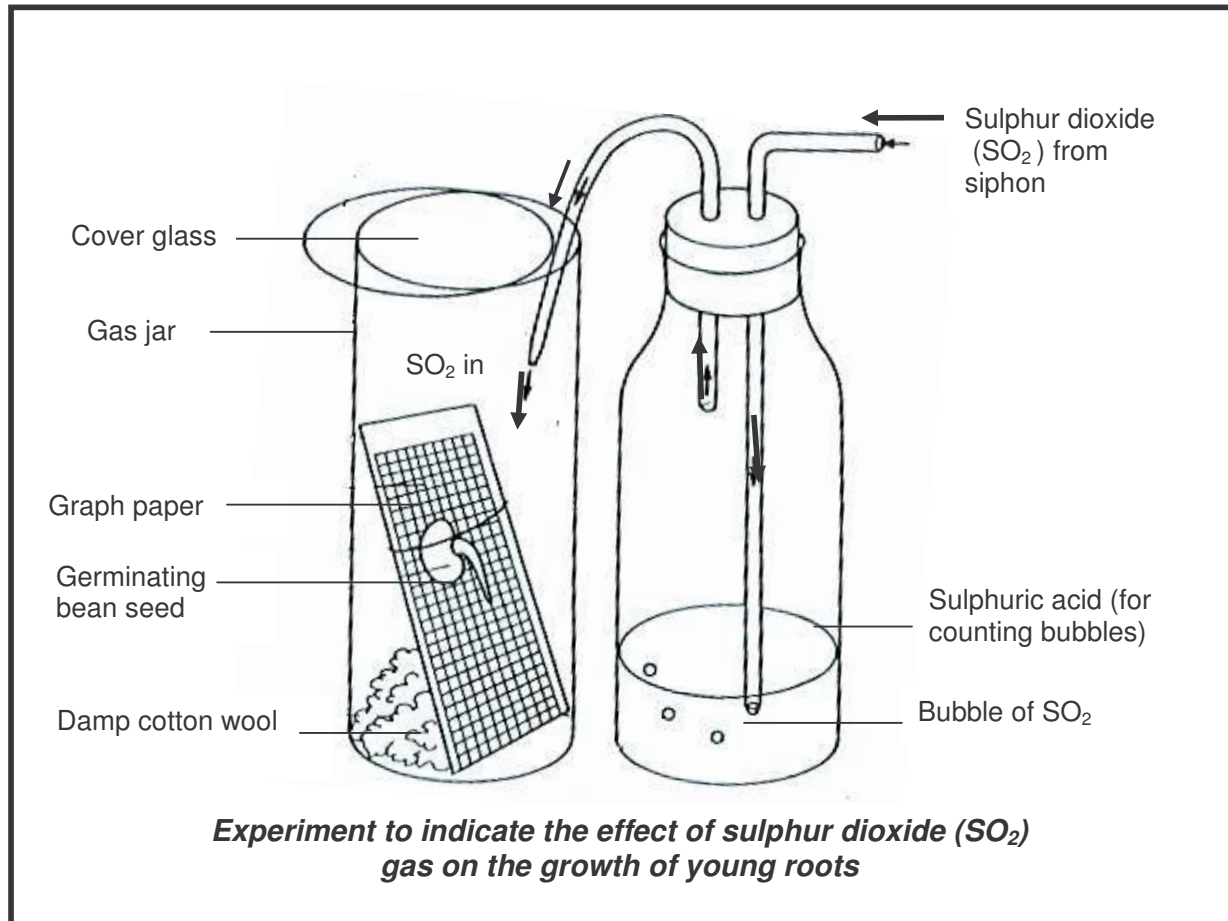
The increase in length of each young root was measured after 5 days and the results were recorded in the table below:

Jar	Number of SO$_2$ bubbles	Increase in length of root after 5 days (mm)
1	5	6
2	10	2
3	20	0,5

2.3.1   Suggest a reason for using the graph paper.   (2)

2.3.2   What control would you set up for this investigation?   (1)

2.3.3   Give a hypothesis being tested by this investigation.   (2)

2.3.4   Predict the effect if 30 bubbles of sulphur dioxide (SO$_2$) were used.   (2)

2.3.5   What effect does sulphur dioxide have on our environment when it
         rains?   (3)
                                                                              [30]

QUESTION 3

3.1   Study the following graph which represents the population of rabbits and wild dogs in a specific habitat and answer the questions that follow:
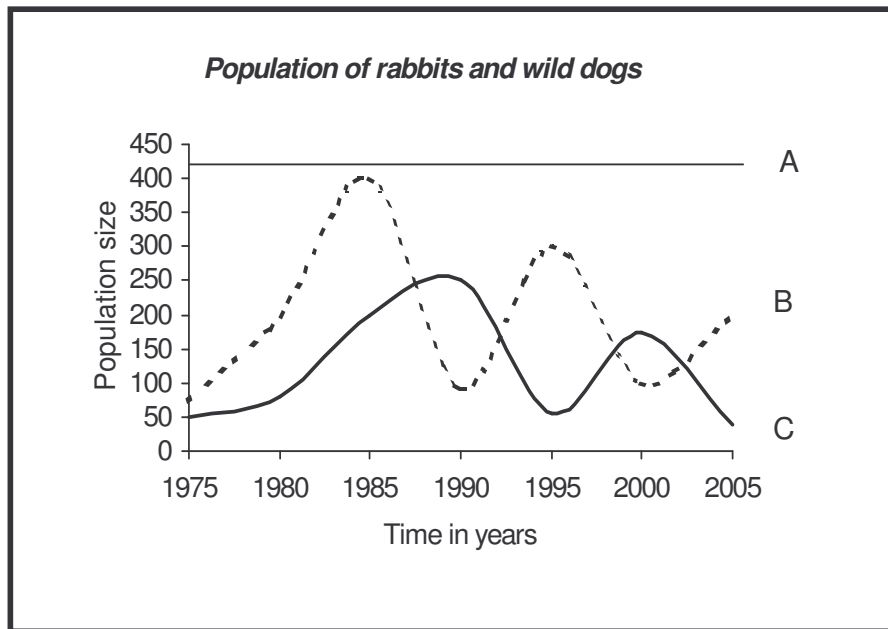
3.1.1   State the relationship shown in the graph.   (1)

3.1.2   Explain how the above relationship acts as a density-dependant factor in regulating the population size of the rabbits and the wild dogs.   (4)

3.1.3   What does line A represent?   (1)

3.1.4   Explain what will happen to population B when its size reaches that indicated by line A.   (2)

3.1.5   Which line (B or C) would represent the rabbit population?   (1)

3.2   Read the following extract and answer the questions that follow:

> *When a region gets little or no rain for a long period of time, we say that the region is experiencing drought. If plants are not suited to dry conditions, they will die.*
>
> *Farmers can treat legume seeds by coating them with a chemical substance that makes the seeds more resistant to dry spells and disguises them from birds.*

     3.2.1   List THREE consequences of drought other than the death of the plants. (3)

     3.2.2   List TWO advantages of the seed-coating process. (2)

     3.2.3   Suggest THREE actions that can be taken to reduce the effects of drought. (3)

3.3   Due to HIV/AIDS, South Africa's population in 2015 is predicted be one fifth less than predicted earlier, reaching only 49 million instead of 61 million. Not only will thousands have died due to HIV/AIDS-related diseases, but the life expectancy will also be affected. In some provinces it could be as low as 33 years by 2010.

     3.3.1   How will HIV/AIDS affect the population growth in South Africa? (1)

     3.3.2   AIDS may reduce life expectancy in some provinces to 33 years. List THREE ways that this can affect families. (3)

3.4   An investigation was done to determine the effect of temperature on the growth of *Salvinia* (Kariba/water plant).   The following procedure was followed:

- Twenty *Salvinia* plants of the same size were placed in each of 10 containers of dam water.
- The containers were of the same size and had equal amounts of water.
- Five containers were placed near the dam.
- Five containers were kept in a greenhouse at a temperature 10 °C higher than those near the dam.
- Weekly, for six consecutive weeks, a sampling technique was used to determine the average number of *Salvinia* plants per container.

Study the graph below, which shows the results of the investigation, and answer the questions that follow:

The growth of Salvinia plants near a dam and in a greenhouse

Key:

― ―   *Salvinia* plants in the greenhouse

―――   *Salvinia* near the dam
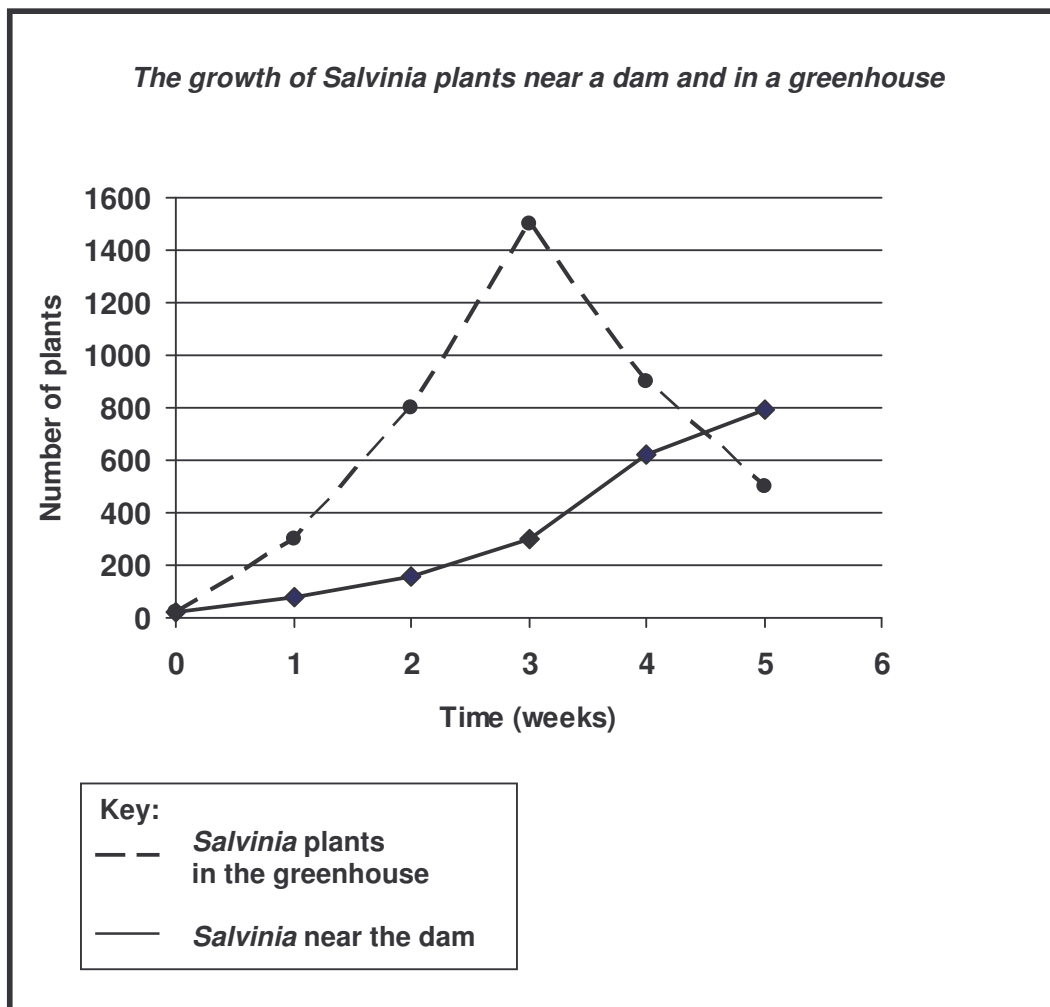
3.4.1   Why were FIVE containers used in each of the conditions?   (1)

3.4.2   During week 4 and week 5, competition could have affected the
         growth of the *Salvinia* in the greenhouse. Which type of
         competition would have affected the growth of the *Salvinia*?   (1)

3.4.3   What type of growth form did the *Salvinia* population show in
         the greenhouse until week 3?   (1)

3.4.4   Draw a table to show the results obtained during the investigation
         for *Salvinia* plants in the greenhouse.   (6)
                                                                            [30]

                                            TOTAL SECTION B: 60

SECTION C

QUESTION 4

4.1   Grade 11 learners in a school wished to investigate populations of invertebrate animals present in a forest. They set out traps at night and returned the next morning to count the collected animals.
The table below shows their results.
Each line (I) represents one organism.

Animal type	Number recorded by students
Beetles	IIIII IIIII IIIII IIIII III
Earthworms	IIII
Snails	II
Spiders	IIIII IIIII IIIII
Woodlice	IIIII III

4.1.1   The students used rotting meat and leaves in their traps. Suggest how the types and numbers of animals collected might be different if they used rotting leaves only.   (4)

4.1.2   Draw a bar graph to show the total number of each animal type caught in the traps.   (11)

4.1.3   The teacher suggested that the mark-recapture technique might give a more accurate estimation of the beetle population. The learners set up the pitfall traps with meat as bait and then marked the beetles they collected with a small spot of white water-soluble paint. They released the beetles into the area they had been collected from, and that evening reset the traps. On the following day the numbers of beetles in the traps were recorded, as shown below:

Beetles in first sample - marked and released (P) = 20
Beetles in second sample (Q) = 30
Marked beetles in the second sample (R) = 10

Use the formula:

$$S \text{ (size of the population)} = \frac{P \times Q}{R}$$

and calculate the total beetle population in the area. Show ALL working.   (3)

4.1.4   Why did the learners use a water-soluble paint rather than an oil-based paint?   (1)

4.1.5   Suggest TWO reasons why the estimated size of the beetle population may differ from the real population size.   (2)

4.2   Read the following passage and answer the questions that follow:

> *The Kruger National Park is South Africa's largest and most famous conservation park. The park has a great variety of plant life and is home to impressive populations of different animal life. A concern is the significant increase in the population size of many species, including the elephant population.*

  4.2.1   Why will an increase in the population size of elephants be of great concern?   (2)

  4.2.2   List TWO ways in which the elephant population size can be kept within an acceptable range.   (2)

4.3   Read the following passage on infectious diseases:

> **Whose responsibility is it?**
>
> *Severe Acute Respiratory Syndrome (SARS), is a respiratory infectious disease that is caused by a virus. It is often described as 'flu-like' because of its symptoms, although its causative agent has no relation to the flu virus. SARS has a 4% mortality rate, but this varies depending on the quality of medical care available, and it can be as high as 10%.*
>
> *This disease has forced countries to work together to find a means of monitoring, reporting and preventing infectious diseases from spreading in the world, by people that travel to other countries.*

With the above-mentioned information in mind, write an essay on whose responsibility it is to prevent the spreading of infectious diseases. State your view on what resources and strategies the government must have or put in place for the prevention and treatment of the diseases. Include at least THREE strategies or ways to prevent and treat the diseases. Name THREE ways in which you, as an individual, can play a role in the management and prevention of infectious diseases.

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

The following rubric will be used to assess your essay:

Criteria	Marks		
	1	**2**	**3**
Viewpoint on government's resources	Relevant view stated on one relevant resource	Relevant views stated on two relevant resources	Relevant views stated on three relevant resources
Explanation of strategies of prevention and treatment	One appropriate explanation given	Two appropriate explanations given	Three appropriate explanations given
Explanation of strategies of treatment	One appropriate explanation given	Two appropriate explanations given	Three appropriate explanations given
Explanation of ways in which you play a role	One relevant explanation given	Two relevant explanations given	Three relevant explanations given
Synthesis	Attempted but with significant gaps in the logic and flow of the answer	Minor gaps in the logic and flow of the answer	Well structured, demonstrates insight and understanding of question

(15)

TOTAL SECTION C: **40**

GRAND TOTAL: **150**