



# education

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Department:  
Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 11**

**LIFE SCIENCES P2**

**NOVEMBER 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. Draw diagrams or flow charts ONLY when requested to do so.
9. The diagrams in this question paper may NOT necessarily be 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 Warming of the Earth due to heat being trapped in the atmosphere is called ...
- A deforestation.
  - B denitrification.
  - C the greenhouse effect.
  - D exploitation.
- 1.1.2 Which ONE of the following will cause an increase in the size of a population?
- (i) Immigration
  - (ii) Mortality
  - (iii) Emigration
  - (iv) Natality
- A (i) and (iv)
  - B (i), (ii) and (iv)
  - C (i), (iii) and (iv)
  - D (ii) and (iii)
- 1.1.3 An organism that transmits a pathogen between hosts is called a...
- A vector.
  - B decomposer.
  - C producer.
  - D consumer.
- 1.1.4 Which ONE of the following best describes the carrying capacity of a habitat?
- A Production of young
  - B An increase in the number of herbivores
  - C A method to protect breeding space in an area
  - D The maximum, stable population size a specific area can support over a long period of time

- 1.1.5 The following table shows the estimated population of blue whales in Antarctica for the period 1900 to 2000.

Study the table and answer the question that follows:

YEAR	ESTIMATED NUMBER OF BLUE WHALES
1900	50 000
1930	35 000
1960	10 000
1985	1 000
1995	5 000
2000	13 000

According to the table, during which period did the whale population drop most rapidly?

- A Between 1900 and 1930
  - B Between 1930 and 1960
  - C Between 1960 and 1985
  - D Between 1985 and 1995
- (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 - 1.2.6) in the answer book.

- 1.2.1 The mass of all the living organisms in an ecosystem
- 1.2.2 A gas, normally produced in the atmosphere, which is needed to shield the earth from ultraviolet light
- 1.2.3 Material that cannot be decomposed by living organisms such as bacteria and fungi
- 1.2.4 The wise and cautious use of our resources so that they are available to current as well as future generations
- 1.2.5 The behaviour of organisms based on learning from their interactions with other organisms
- 1.2.6 Animals mark out an area and defend it against intruders (6)

- 1.3 Choose an item from COLUMN B that matches a description in COLUMN A. Write only the letter (A - I) next to the question number (1.3.1 - 1.3.5) in the answer book, for example 1.3.6 J.

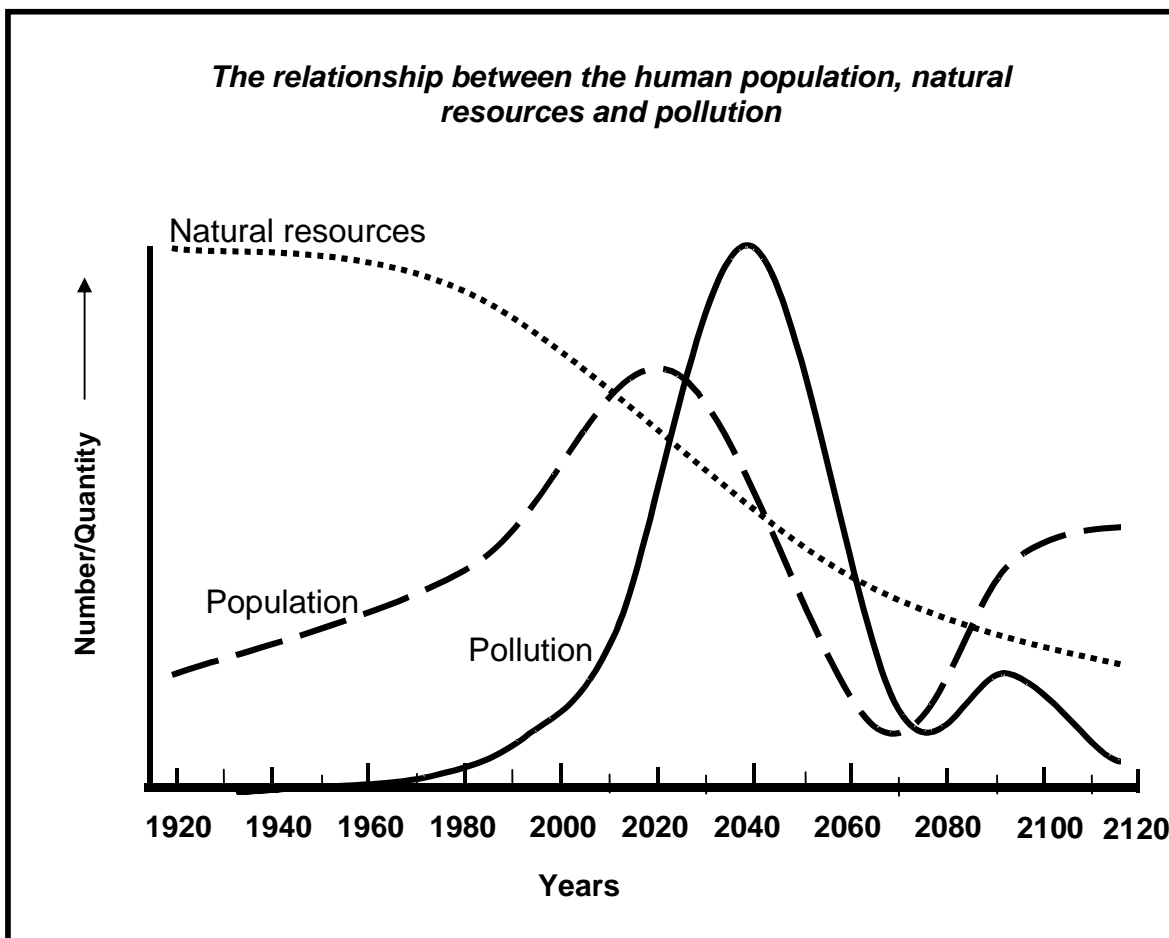
COLUMN A		COLUMN B
1.3.1	A number of interconnecting food chains	A predation
1.3.2	Periodic departure from, and return to, a habitat	B community
1.3.3	Feeds on dead animals and plants	C decomposer
1.3.4	A group of organisms of the same species in the same habitat	D pyramid
1.3.5	Using natural predators to reduce the pest population	E migration
		F producer
		G biological control
		H population
		I food web

(5)

1.4 At a world summit, several countries submitted their statistics on the following:

- The amount of resources they have
- The population size of their country
- The level of pollution in their country

This information was used to draw a graph and make predictions for the future.



- 1.4.1 Describe the relationship between the human population, natural resources and pollution over the period 1920 to 2020. (3)
- 1.4.2 During which year is pollution likely to reach its maximum? (1)
- 1.4.3 What direct technique would the countries have used to determine the size of their human population? (1)
- 1.4.4 From 2070 the world population is predicted to increase again. Explain why this might happen. (2)

1.5 In an investigation to determine the number of beetles in an area, 50 beetles were caught and a spot of paint was applied to each. A few days later, a sample of 90 beetles was caught from the same field. In the second catch, 5 beetles had spots of paint on them.

1.5.1 Determine the size of the population by using the following formula:

$$A = \frac{B \times C}{T}$$

A = Size of the population

B = Number caught and marked in the first catch

C = Number caught in the second catch

T = Number with paint spots in the second catch

Show ALL calculations. (3)

1.5.2 Give TWO reasons why the estimated size of the population might differ from the real population size. (2)

1.6 Differentiate between each of the following:

1.6.1 Density-dependent factors and density-independent factors (4)

1.6.2 Inter-specific competition and intra-specific competition (2)

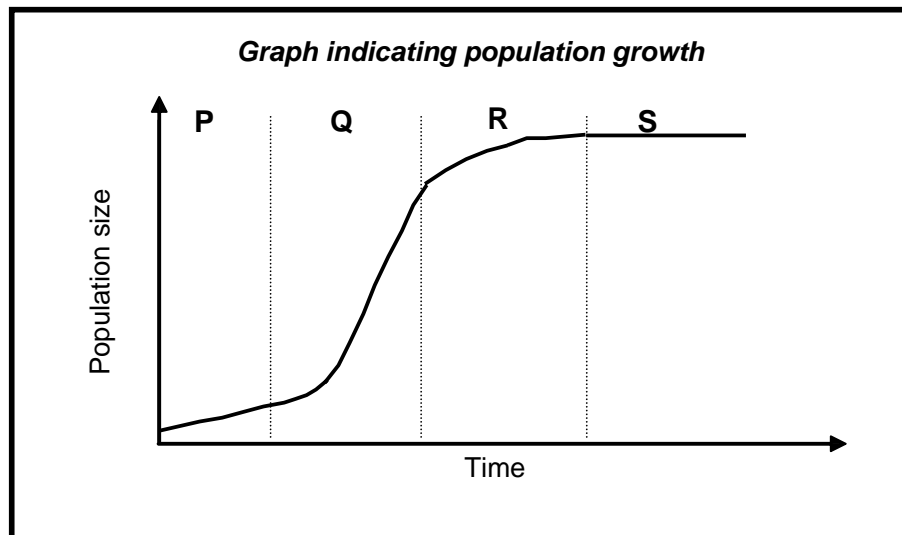
- 1.7 An investigation was conducted to determine the amount of smoke in the air in and around a city.

Study the table below that shows the results of this investigation and answer the questions that follow:

<b>Distance from city centre in kilometres</b>	<b>Micrograms of smoke per cubic metre of air</b>
0	120
3	90
6	60
9	50
12	20

- 1.7.1 What is the relationship between the amount of smoke in the air and the distance from the city centre? (2)
- 1.7.2 Bronchitis is a disease that causes inflammation of any part of the bronchi and bronchial tubes. Smoking and the inhalation of smoke are the main causes of bronchitis.
- How will the number of bronchitis patients in and around this city centre differ from those that stay 12 kilometres away from the city centre? (1)

- 1.8 Study the following graph of population growth and answer the questions that follow:



- 1.8.1 Name the growth form shown in the graph. (1)
- 1.8.2 Identify phases P and Q. (2)
- 1.8.3 Give TWO reasons why phase P starts slowly. (2)
- 1.8.4 At which phase does:
- (a) Birth rate equal death rate (1)
  - (b) Environmental resistance come into effect (1)
  - (c) The birth rate exceed the death rate by far (1)

**TOTAL SECTION A: 50**

**SECTION B**

**QUESTION 2**

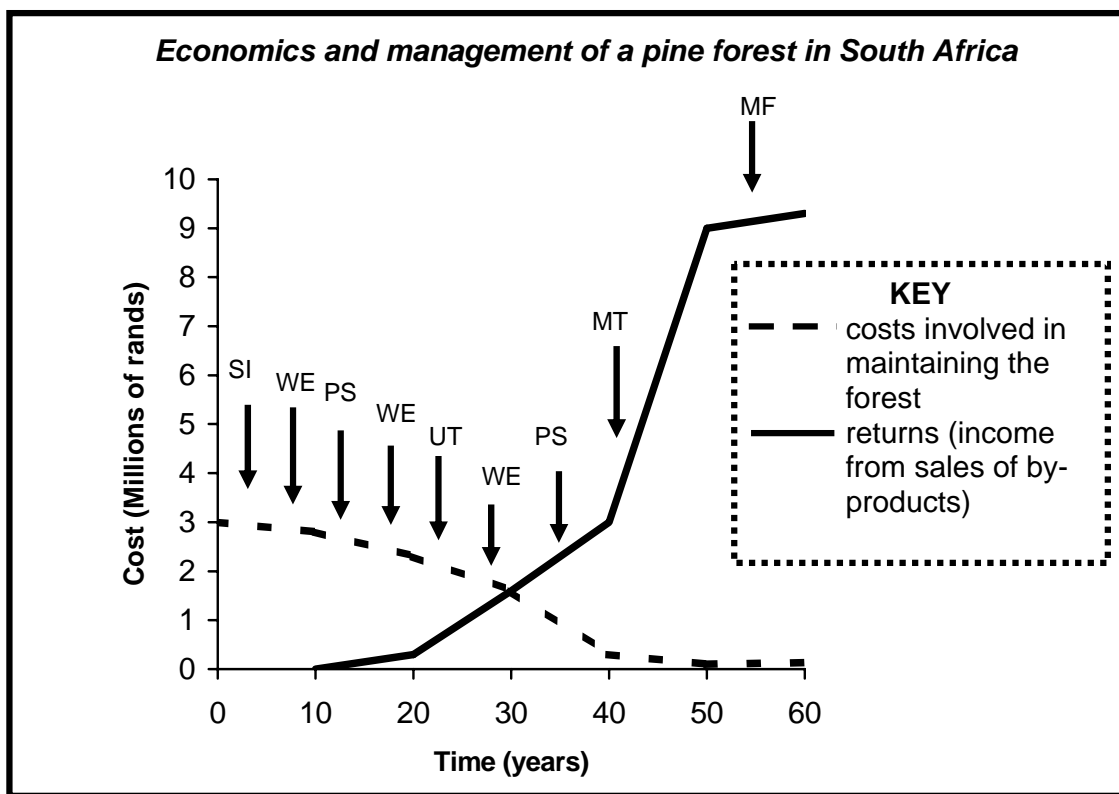
2.1 Food chains can be represented as pyramids of numbers, biomass or energy.

2.1.1 Make a drawing of a pyramid of numbers using the following information:

5 water lily plants, 20 herbivorous fish, 10 carnivorous fish, 5 fish eagles (3)

2.1.2 Explain why a pyramid of numbers is not the best way to represent trophic relationships in an ecosystem. (2)

2.2 The graph and key below refer to the economics and management of a forest of pines in South Africa.

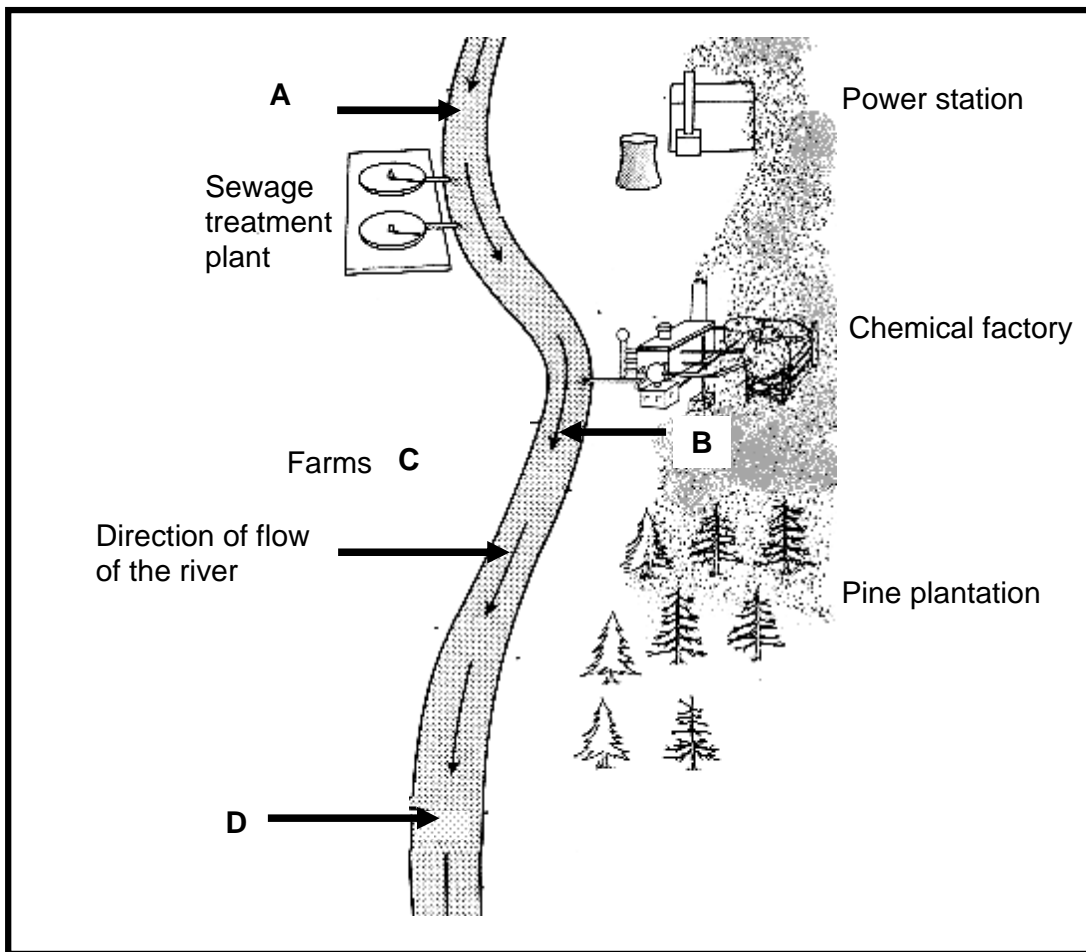


**Key to management practices**

SI	=	site improvement
PS	=	pesticide spraying
WE	=	weeding
UT	=	unmarketable thinning removed (some trees that could not be sold were removed)
MT	=	marketable thinning taken and sold (some trees were removed and sold)
MF	=	mature forest felled and sold

- 2.2.1 How many times were the trees sprayed with pesticide? (1)
- 2.2.2 How many different types of management practices were applied to the forest during its first 25-year growth period? (1)
- 2.2.3 Describe the relationship that exists between costs and returns over the given period of time. (2)
- 2.2.4 After how many years did the costs equal returns? (1)
- 2.2.5 Give TWO reasons why the use of pesticides may be harmful to the environment. (2)
- 2.2.6 Suggest why weeding and thinning out (removing of weaker trees) will improve the quality of the remaining trees in the future. (2)

2.3 Study the following diagram indicating the flow of a river through an area and the activities close to the river bank.



- 2.3.1 Why are fishermen likely to catch more fish at point A than point D? (2)
- 2.3.2 Many trees in the pine plantation are dying. Suggest TWO reasons why this might be happening. (2)
- 2.3.3 If the sewage treatment plant breaks down, untreated sewage will enter the river. What is likely to happen to the amount of oxygen in the water at point B? (1)
- 2.3.4 Explain your answer to QUESTION 2.3.3. (2)
- 2.3.5 Explain how fertiliser used by the farmer on his crops could influence the growth of waterweeds at D. (2)
- 2.3.6 State and explain ONE advantage of pesticides that are sprayed on crop. (2)

- 2.4 Read the following paragraph and answer the questions that follow:

***Poverty and Desertification: The Vicious Circle***

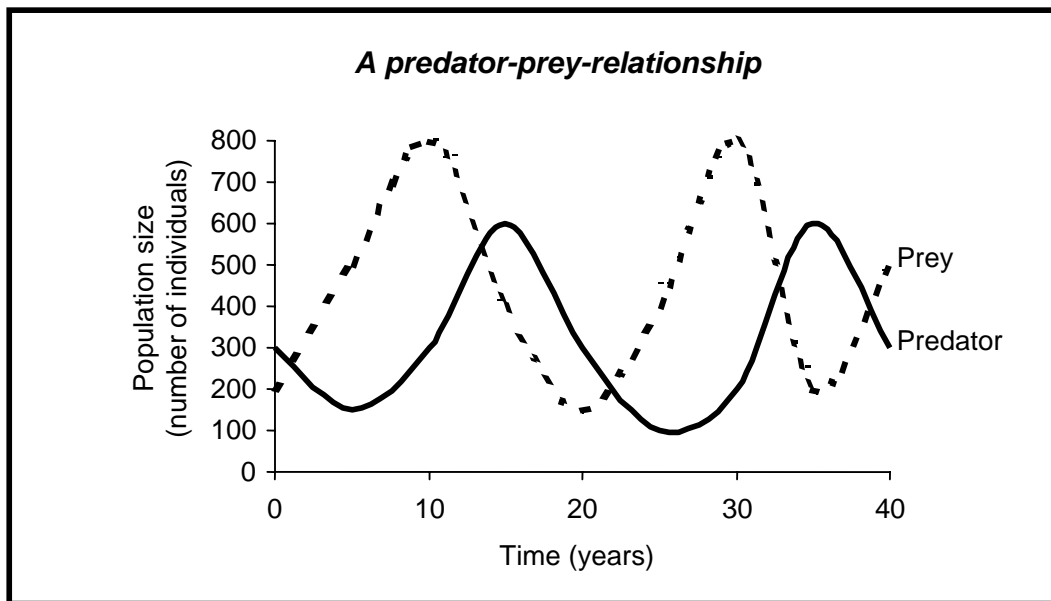
Economic pressures can lead to the over-exploitation of land and usually affects the poorest the most. Forced to extract as much as they can from the land for food, energy, housing and source of income, the poorest contribute towards, and are the victims of, desertification. Poverty leads to desertification, which in turn leads to greater poverty.

- 2.4.1 Explain how economic pressure may lead to desertification. (2)
- 2.4.2 The people of Africa will exploit the resources of Africa. Name THREE uses of the resources that the people of Africa are likely to extract from the land. (3)

**[30]**

**QUESTION 3**

3.1 Study the following graph which shows a predator-prey-relationship in a specific habitat and answer the questions that follow:



- 3.1.1 How many prey were there at the beginning of the investigation? (1)
- 3.1.2 What maximum size did the predator population reach? (1)
- 3.1.3 What happens to the predator population shortly after a decrease in the prey population? (1)
- 3.1.4 Give a reason for your answer to QUESTION 3.1.3. (1)
- 3.1.5 Give TWO reasons why some animals in a prey population are more likely to be caught by the predators than other animals. (2)

3.2 A learner conducted an investigation to determine the population growth of bacteria. She found that under optimum conditions the bacteria population doubled every twenty minutes. She therefore counted the number of bacteria every twenty minutes over a two-hour period.

3.2.1 List TWO examples of optimum conditions for bacterial growth. (2)

3.2.2 Copy the following table in the answer book and complete the SECOND column to show the results she obtained:

***The number of bacteria over a two-hour period***

<b>Time (minutes)</b>	<b>Number of bacteria</b>
0	1
20	
40	
60	
80	
100	
120	

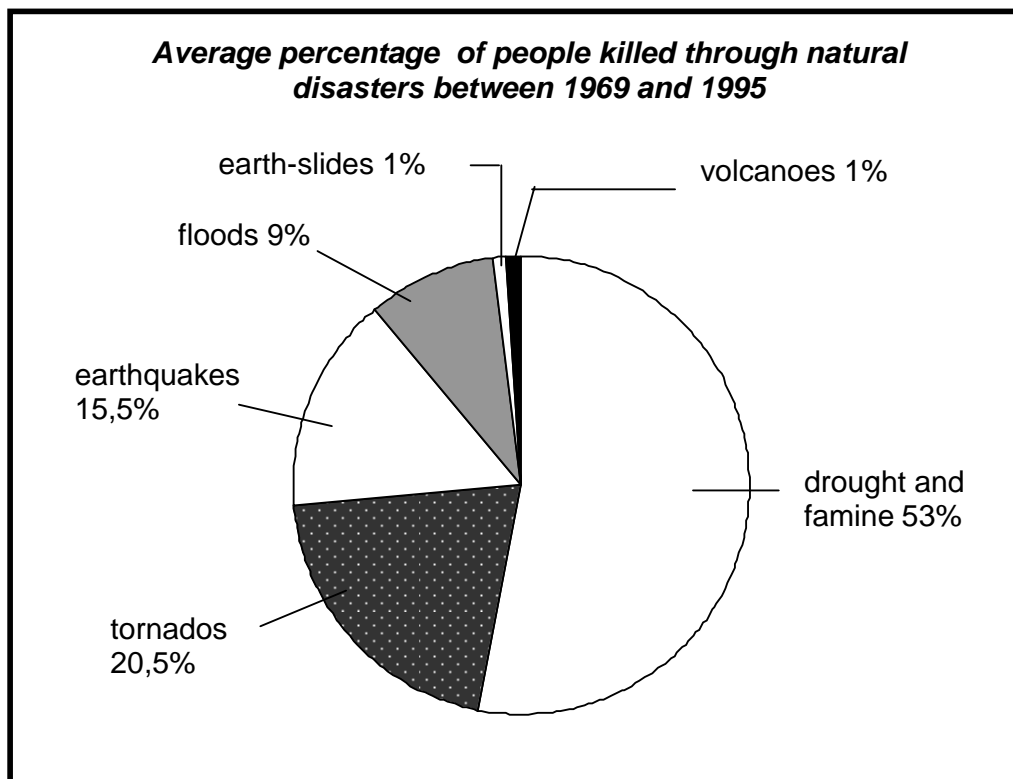
(4)

3.2.3 Why will it be necessary for the learner to undertake more than one count of the bacteria every 20 minutes? (1)

3.2.4 As a result of the population size reached after 120 minutes, how long will it take the bacteria population to reach a population size of 512? (2)

3.3 Natural disasters are events occurring naturally under, on, or above the earth's surface and cause significant loss of life or property or damage to the environment.

Study the pie chart below which shows the average percentage of people killed through natural disasters between 1969 and 1995 and answer the questions that follow:



- 3.3.1 List TWO of the above-mentioned disasters that occur as a result of severe climatic conditions. (2)
- 3.3.2 Which type of disaster resulted in the second highest percentage of deaths? (1)
- 3.3.3 List THREE ways in which earth-slides could influence the ecosystem in which they occur. (3)

3.4 Read the following passage and then answer the questions that follow:

People have been using plants to make medicines for thousands of years. Most of the population in South Africa use traditional medicines. Traditional healers use about 700 different kinds of plants. Many of the herbs, roots, leaves and types of tree bark used by traditional healers are now very scarce.

- 3.4.1 List TWO reasons why many patients, especially in the rural areas, visit traditional healers. (2)
- 3.4.2 Explain why traditional healers should not be allowed to use as many plants as they like. (3)
- 3.4.3 Suggest TWO possible solutions to the problem that some plants are becoming very scarce. (2)
- 3.4.4 Plants, such as wild ginger, have been traditionally used for treating coughs. What modern medicines do people use for colds and flu? (2)

**[30]**

**TOTAL SECTION B: 60**

**SECTION C****QUESTION 4**

- 4.1 The following data represents recent measurements of the average global CO<sub>2</sub> concentration in the atmosphere:

Year	CO <sub>2</sub> concentration (parts per million)
1960	200
1965	320
1970	330
1975	335
1980	340
1985	350
1990	355
1995	365
2000	380
2005	390

- 4.1.1 List TWO precautions that scientists should take when they collect data to represent an average global concentration of CO<sub>2</sub>. (2)
- 4.1.2 Plot a line graph of the data given in the table. (11)
- 4.1.3 Compare the trend in the CO<sub>2</sub> level in the period 1960 to 1965 with the period 1965 to 2005, shown in the graph that you have drawn. (2)
- 4.1.4 Use your graph to predict the possible CO<sub>2</sub> level in 2010. (2)
- 4.1.5 Name and explain THREE factors that could contribute to the trend shown in the table between 1960 and 2005. (6)
- 4.1.6 List TWO effects on ecosystems if the carbon dioxide concentrations continue to change, as shown in the table. (2)

- 4.2 Read the article below on a country's 'one-child-per-married-couple' policy and answer the questions that follow:

In 1980 the population of a particular country was about 20% of the total human population. The government introduced the 'one-child-per-married-couple' policy to reduce great increases in the population size. The effect of this policy was that the average number of children per female was lowered from 5,01 in 1980 to 1,84 in 2005.

Write an essay that explains the negative effects overpopulation could have on the environment. If the 'one-child-per-married-couple' policy was introduced in South Africa, list and explain at least THREE reasons why you would or would not support it.

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

**The following mark scheme will be used to assess your essay:**

Criteria	Marks		
Negative effect on the environment	3 effects at 1 mark each (3)		
Reason you would/ would not support the policy	Three reasons at 1 mark each (3)		
Explanation of reason	Three explanations at 2 marks each (6)		
	<b>1</b>	<b>2</b>	<b>3</b>
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 the question

(15)

**TOTAL SECTION C: 40**

**GRAND TOTAL: 150**