



GRADE 11 EXAMINATION  
NOVEMBER 2007

**LIFE SCIENCES: PAPER II**  
**SECTION B and C**

Time: 2½ hours

100 marks

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**PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY**

1. This question paper consists of SECTION A (pages i – vi) and SECTION B and C (pages 1 to 10). Please check that the question paper is complete.
  2. Section A must be answered in the Answer Booklet provided. Sections B and C must be answered on the lined paper provided.
  3. Read the questions carefully.
  4. Number the answers exactly as the questions are numbered.
  5. It is in your interest to write legibly and to present your work neatly.
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**SECTION B**

Answer the question in this section on the lined paper provided.

**QUESTION 2**

PLEASE NOTE THAT THE ANSWER FOR QUESTION 2.3 IS TO BE COMPLETED ON PAGE (vi), THE LAST PAGE OF SECTION A.

Read the following text about Marion Island, a Southern Ocean island approximately 500 km south of Durban. Marion Island is a South African Island, and houses a weather station base. Answer the questions on page 3, which are based on the text.

**The Cat Eradication Programme**

Five domestic cats, including a castrated, orange-striped, male tabby and a black and white female together with three kittens were brought to Marion Island in 1949. These cats were brought to the island to help eradicate a mouse problem in the weather station base. As cats do, they soon multiplied and the first feral (wild) cat was seen in 1951.

By 1975, the population has increased to more than 2 000 cats feeding on thousands of burrowing petrels (indigenous birds) which were much easier to catch than the mice they were supposed to hunt. In 1975 alone, the cats ate just under half a million birds and species such as the Common Diving Petrel, the Soft Plumage Petrel and the Grey Petrel became extinct on Marion Island.

With other remaining bird species also at risk, it was decided to introduce the Marion Island Cat Eradication Programme. In 1977, the entire cat population was estimated at about 3 405 individuals. Scientists caught and injected a few cats with a disease highly specific to cats: feline panleucopenia. By 1982 there were an estimated 615 cats remaining.

During the spring of 1986, a secondary control measure was initiated. For three summers, eight, two-man teams using spotlights and 12-bore shotguns killed approximately 803 cats at night. After a while it was realised that hunting was no longer successful in reducing the numbers, as cats were still being seen.

Traps were used and, between 1989 and 1991, the remaining cats were removed. During the 12-month period after April 1991, only eight cats were trapped and three trapping teams recorded no sightings. It is now (in 2006) believed that complete eradication of feral cats on Marion Island has been achieved after 19 years.

[Adapted]

2.1 From the text, identify

2.1.1 a predator species,

2.1.2 two prey species

(3)

2.2 What factors would help you identify the three types of petrel as being three different bird species?

(3)

2.3 **The graph grid for this question is on page (vi), the last page of the SECTION A booklet.** Using information from the text, join the plotted points to draw a line graph of the cat population on Marion Island, on the set of axes provided.

(2)

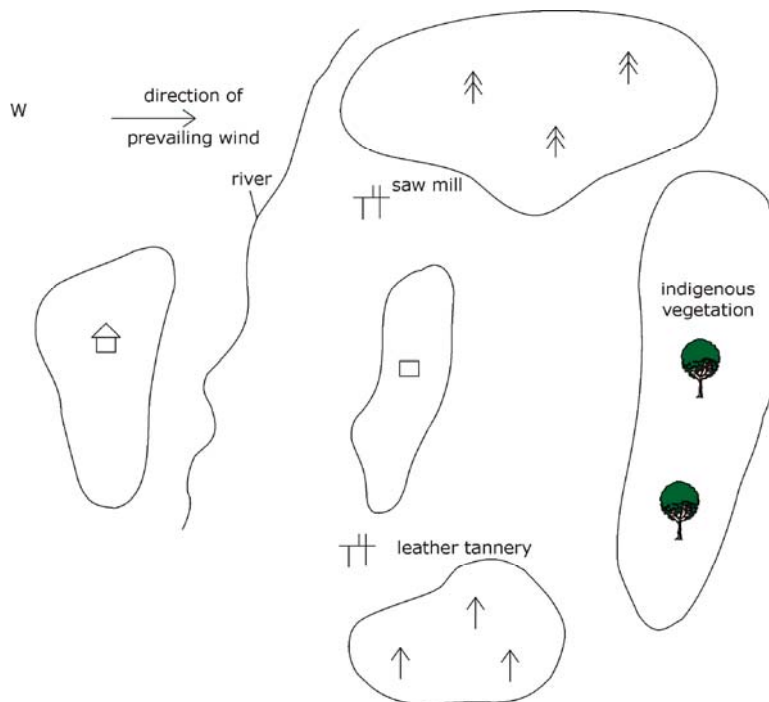
- 2.4 Using vertical arrows, mark the following events on your graph, on page (vi) of SECTION A, with an arrow labelled D for where disease was introduced, an arrow labelled S for where shooting of the cats was introduced and an arrow labelled T for trapping. (3)
- 2.5 Do you consider "shooting" a density-dependent factor or a density-independent factor for controlling the size of the cat population? Explain your answer. (3)
- 2.6 Briefly describe how the scientists on the island could have estimated the size of the cat population. What type of estimation is this? (2)
- 2.7 In your opinion which activity, infecting the cats with a disease, shooting the cats or trapping the cats, was the most effective in eradicating (destroying) the cat population? Explain your answer. (4)

**20 marks**

**QUESTION 3**

Study the diagrams on this page and on page 4.

**Town X 30 years ago**

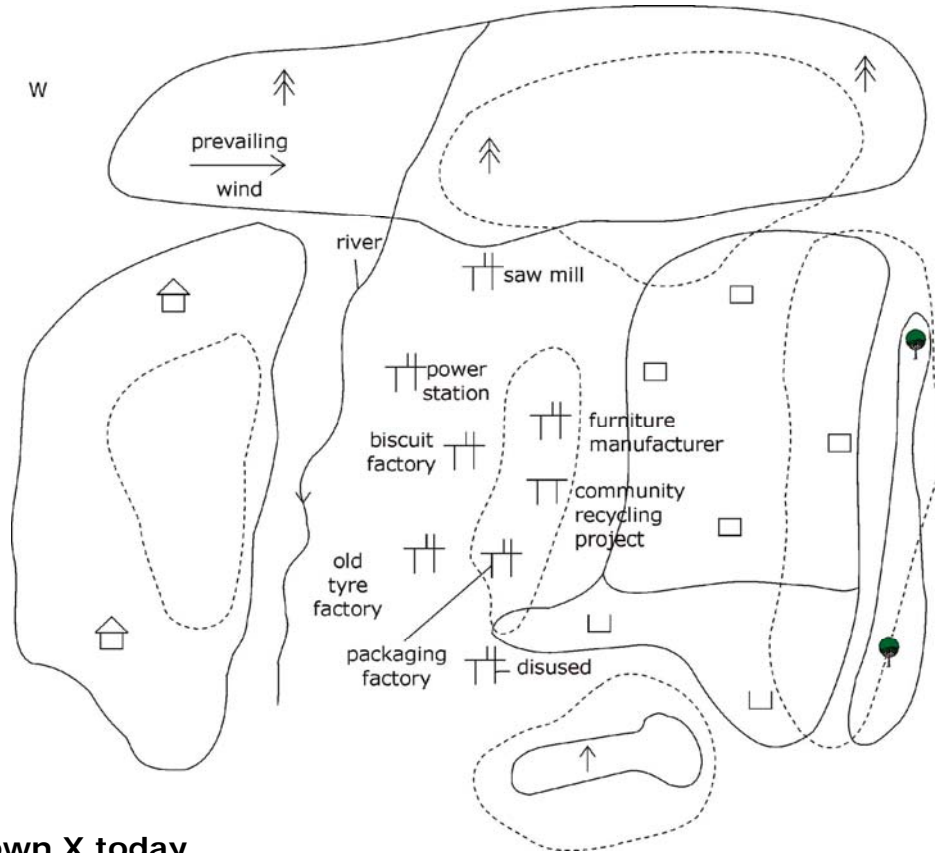


**Key for Town X 30 years ago**

⊥⊥	Factory that produces effluent into the air
↑	Pine trees
↑	Black wattle
⌆	Middle-income housing
□	Low-income housing

**Town X today**

----- shows change in size between 30 years ago and today



**Key for Town X today**

	Factory that produces effluent into the air
	Factory that produces no effluent into the air
	Pine trees
	Black wattle
	Middle-income housing
	Low-income housing
	Shacks

- 3.1 State two differences between the industries in Town X 30 years ago and Town X today. (2)
- 3.2 What kind of relationship is there between the size of industry and air pollution when comparing the town 30 years ago and today? (4)
- 3.3 Describe one way in which biodiversity in Town X today has been reduced by changes in land use. (3)
- 3.4 If you were a person with a low weekly wage, which low-income area would you prefer to live in, the house area or the shack area? Explain your choice. (4)

The following advertisement appeared in English language national newspapers earlier this year.

<p><b>environment &amp; tourism</b>          Department:          Environmental Affairs and Tourism          REPUBLIC OF SOUTH AFRICA</p>
<p>Do you live in an area where there is air pollution from:</p> <ul style="list-style-type: none"> <li>- factories?</li> <li>- oil refineries?</li> <li>- mining?</li> <li>- industries or human activities besides the ones mentioned above?</li> </ul> <p>The Department of Environmental Affairs and Tourism wants to make your air cleaner!</p> <p>Throughout South Africa we want to</p> <ul style="list-style-type: none"> <li>• know where there is air pollution in places where people live</li> <li>• get factories to reduce the amount of air pollution they produce</li> <li>• make sure there are national standards for clean air</li> <li>• make sure that standards for clean air are maintained</li> <li>• make sure that standards for clean air in South Africa meet international standards.</li> </ul> <p>If you are an interested or affected party,</p> <ul style="list-style-type: none"> <li>↳ you can bring air pollution problems in your area to our attention, and/or</li> <li>↳ you can get involved in developing a process for the management of air quality.</li> </ul>
<p><b>PUBLIC INVOLVEMENT IS ENCOURAGED</b></p>
<p><i>For more information and to register as an interested or affected party, please contact:          Wilhelmina Mosupye or Anelle Odendaal          Tel: 011 254 4901/4855          Fax: 011 805 2100</i></p> <p style="text-align: center;"><b>PLEASE RESPOND WITHIN 14 DAYS</b></p>

[Adapted from the *Cape Times* April 2007]

3.5 Which government department has put out this advertisement? Write the letter only.

- A Home Affairs
- B Environmental Affairs and Tourism
- C Transport Affairs

(1)

3.6 Which of the following is a problem with this advertisement? Write the letter only.

- A No final date of registration is given.
- B No contact telephone number is given.

- C No contact name is given. (1)
- 3.7 You and your family live in Town X in the middle-income area. Mr Sandile Moyo, the gardener who works for your family, lives in the low-income housing area where there is a lot of air pollution. He sees this advertisement in the newspaper and asks for your help.

After reading the advertisement, you believe that what affects Mr Moyo's low-income community is:

- **get factories to reduce the amount of air pollution they produce**

You want to help Mr Moyo obtain correct information from his community so that they can respond to this advertisement. Draw up a list of 3 questions that he can use to survey the problem of air pollution in town X and its impact on specific people. Give your list a heading. (5)

<b>20 marks</b>
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#### QUESTION 4

Read the article below headed "The fatal cost of greed and wanton destruction of ancient forests" to answer the questions which follow it.

##### **The fatal cost of greed and wanton destruction of ancient forests**

1. There are few places on Earth quite as beautiful as the forests of East Africa. Many are remnants of continent-wide forests that once stretched from the Indian to the Atlantic Ocean. These forests are treasure houses of biodiversity, the sorts of places where, one day, humans will find a cure for AIDS, for cancer or a rare mineral that will safely power a city the size of Manhattan for a year on a teaspoonful of dust.
2. The problem is that, like forests anywhere on Earth, they are being chopped down at a terrifying rate. In the Congo, illegal logging is busy wiping out huge parts of the majestic Ituri and other forests.
3. In Kenya, Uganda and Tanzania, activities such as slash and burn agriculture on the forest margins, illegal saw-mill operations deeper in the forest and commercial operations largely operated by politically well-connected companies have also led to deforestation.
4. The most beautiful forests of all are those that lie in western Kenya and eastern Uganda in areas where there is little human development. Perhaps the most beautiful forest of them all is the Mariba Forest, between Jinja and Kampala in Uganda.
5. As you walk softly along Mariba's paths, you stand a good chance of spotting one of at least 13 species of primates, including the recently identified grey-cheeked mangabey. There are already 312 identified tree species and 287 identified bird species.
6. But soon, what you are likely to hear and see are chain saws. At the beginning of this month, Ugandan President Yoweri Museveni's cabinet approved plans to give a quarter of the forest – 7 000 hectares – to the Sugar Corporation of Uganda, owned by the Mehta Group. There they will chop down forests and plant sugar cane, a sterile monoculture.

7. When questioned in parliament about this decision, a minister of the environment said that "an alternate piece of land with similar climatic conditions" would be provided to plant a forest to replace Mabira. She also said that the newly-found species of grey-cheeked mangabey would be captured and moved to another forest "where they would be easily seen".
8. What was not made clear in parliament was that the area, where the sugar cane fields are to be planted, is one of the main catchment areas for Lake Victoria. Already, fishermen are being driven to poverty because of poor catches due to shrinking water levels and rapidly rising concentrations of industrial and agricultural pollution in the waters.
9. There has been growing resistance to exploitation of the Mabira Forest from the Baganda people, whose Baganda Kingdom is one of the most powerful in Uganda. The Baganda believe that Mabira is home to their gods of food and rain and that the forest will protect their king's palace from hurricanes.
10. Yesterday, thousands of people gathered in Kampala to protest against destruction of the Forest. Tragically, things got out of control fast. Two Asian traders were beaten to death and at least two protesters were shot dead.
11. Equally tragic is the decision of the Museveni government to destroy what is not only a priceless heritage of the Baganda and Uganda people, but of all Africans.

[Adapted from the article written by Tony Weaver for the *Cape Times*, Friday April 13, 2007]

- 4.1 In which part of East Africa is the Mabira Forest, mentioned in paragraph 4, found? (2)
- 4.2 From the article, list three ways in which deforestation has already occurred (paragraph 3). (3)
- 4.3 Approximately 51 hectares of the proposed sugar cane plantation area will be needed for road construction, offices and a processing plant. What percentage is this of the 7 000 hectares proposed sugar cane plantation area (paragraph 6)? Show your working. (4)
- 4.4 Explain how deforestation affects the water cycle. (4)
- 4.5 Write a flow chart of how the use of agricultural chemicals, such as nitrates, could have resulted in the drop of fish numbers in Lake Victoria (paragraph 8). (7)

**20 marks**

**QUESTION 5**

5.1 Brown hyenas are large carnivores living in the drier parts of Africa such as the Kalahari Desert in Botswana. The animals are solitary hunters and scavenge from the kills of other predators such as lions. In the dry season, when lions expand their territories, these hyenas switch to eating smaller prey such as reptiles, rodents and birds.

The hyenas live in small clans and are organised into dominance hierarchies. (A dominance hierarchy is a social system where certain animals are allowed access to resources such as food, water, mates, etc. before the others.)

Researchers have found that the position of a female in a hierarchy is strongly associated with the amount of time that she spends feeding on carcasses in the area.

[Adapted from: Scottish Qualification Authority Biology Advanced Higher Specimen Question paper for use in 2005]

5.1.1 Name an animal that lions prey on. (1)

5.1.2 Compare the ways hyenas feed in wet and dry seasons. (4)

5.1.3 Explain why dominant (more important) brown hyena females were found to have many more cubs survive to maturity (36 months) than subordinate (less important) brown hyena females. (3)

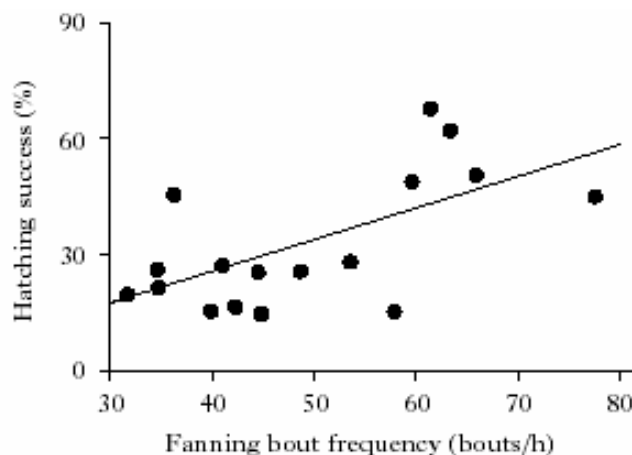
5.2 In spring, the male of a particular fish species builds a nest and then attempts to attract a female to lay eggs in it. Only the male looks after the young, "fanning" the nest with his fins to increase the flow of oxygenated water through it. A female's choice of males seems to be based on the behaviour of the male after he has built the nest, particularly the amount of times spent on fanning which begins as soon as the nest is completed.

The reproductive behaviour of this fish species was investigated. Results are shown in three graphs, one graph below and two on the next page.

Graph I is a scattergram which shows the relationship between the numbers of fanning periods per hour and hatching success.

[Adapted from: Scottish Qualification Authority Biology Advanced Higher Specimen Question paper for use in 2005]

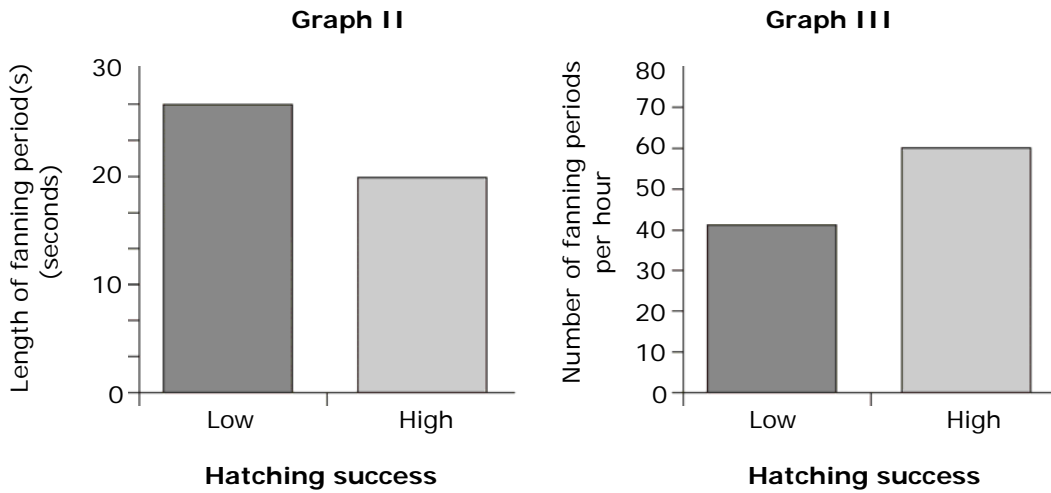
**Graph I**





5.2.1 From Graph I, identify the independent and dependent variables. (2)

5.2.2 Explain the relationship shown in the scattergram. (3)



5.2.3 By referring to graphs II and III, which is the best behaviour strategy for males to use in order to increase the hatching success of eggs so as to increase population size? (4)

5.2.4 Different behaviours concerning senses are used to control population density. The behaviours involve: using sight, using smell, using hearing or using touch.

(a) Which type of behaviour applies to this species of fish? (1)

(b) Suggest why the behaviour you named in (a) above, and not others, would be a reliable type of behaviour for this fish species to use. (2)

**20 marks**

**SECTION C**

In this section, you are required to provide a piece of extended writing. You must give an opinion and as many reasons as possible for your opinion. You will be assessed on the structure of your argument as well as on the way in which you communicate your ideas.

**QUESTION 6**

The question is based on the text about the newspaper article, headed

"The fatal cost of greed and wanton destruction of ancient forests" which is on page 6 and 7 of SECTION B.

Do you think that the Ugandan President's cabinet made an ethical (correct) decision to allow one-quarter of the Mabira Forest to be chopped down and used for sugar plantations? Justify your opinion.

<b>20 marks</b>
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**Total: 100 marks**