10832

LIFE SCIENCES

Second Paper

15 pages

LIFE SCIENCES
(Second Paper)

TIME: 2½ hours

MARKS: 150

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 EACH question on a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. If answers are NOT presented according to the instructions of each question, candidates will lose marks.
6. ALL drawings should be done in pencil and labelled in blue or black ink.
7. Draw diagrams or flow charts ONLY when requested to do so.
8. The diagrams in this question paper may NOT necessarily be drawn to scale.
9. The use of graph paper is NOT permitted.
10. Non-programmable calculators, protractors and compasses may be used.
11. Write neatly and legibly.

SECTION A

QUESTION 1

1.1 Various possible options are provided as answers to the following questions. Choose the answer and write only the letter (A – D) next to the question number (1.1.1 – 1.1.6) in the ANSWER BOOK, for example 1.1.7 D.

1.1.1 Which of the following is NOT an example of an alien invasive species in South Africa?

A. King Protea
B. Black Wattle
C. Port Jackson
D. Eucalyptus

1.1.2 Which statement best explains the significance of meiosis in the process of evolution within a species?

A. The gametes produced by meiosis ensure the continuation of any particular species by asexual reproduction.
B. Equal numbers of eggs and sperm are produced by meiosis.
C. Meiosis produces eggs and sperm that are alike.
D. Meiosis provides for variation in the gametes produced by an organism.

1.1.3 Extinction of species CANNOT occur as a result of …

A. disease.
B. volcanic eruptions.
C. fossilisation.
D. competition.

1.1.4 Which of the following may be reasons for the exploitation of natural resources?

(i) Shortage of food
(ii) Use of indigenous plants for medicinal purposes
(iii) Use of wood to cook food

A. (i) and (iii)
B. (i) and (ii)
C. (ii) and (iii)
D. (i), (ii) and (iii)

1.1.5 Common water-borne diseases are …

A. asthma, typhoid and TB.
B. asbestosis, cholera and HIV/Aids.
C. bilharzia, malaria and emphysema.
D. typhoid, cholera and bilharzia.

1.1.6 According to the theory of continental drift, all the land masses were joined together to form one super-continent called ...

A. Gondwanaland
B. Pangaea
C. Eurasia
D. Laurasia 6x2=(12)

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 – 1.2.7) in the ANSWER BOOK.

1.2.1 Numerous interacting food chains that show the feeding relationships in an ecosystem

1.2.2 Chemical energy from organisms that lived in the past

1.2.3 Organisms that have the ability to manufacture their own food

1.2.4 The removal of trees in large quantities to provide space for more land

1.2.5 The collection of plants or animals by illegal means

1.2.6 The regulation of a pest or a weed by using another organism

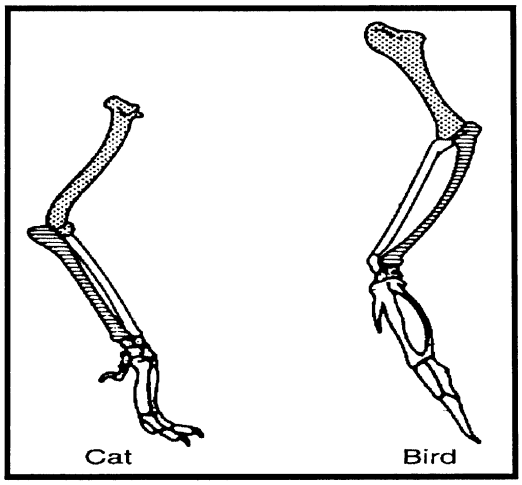
1.2.7 A group of organisms of the same species occupying a specific area at a particular time with the ability to interbreed. (7)

1.3 Choose an item from COLUMN B that matches a description in COLUMN A. Write only the letter (A – N) next to the question number (1.3.1 – 1.3.7) in the ANSWER BOOK, for example 1.3.8 O.

COLUMN A		COLUMN B	
1.3.1	The study of fossils	A	Hypothesis
1.3.2	A change in the structure of a gene	B	Bio-degradable
1.3.3	Lung disease caused by a type of air pollution	C	Abiotic
		D	Asbestosis
1.3.4	The ability of a substance to be broken down into simpler substances by natural processes of decay	E	Mutation
		F	Palaeontology
		G	Genetic drift
1.3.5	An educated prediction based on an observation	H	Dysentery
		I	Cholera
1.3.6	Large changes which brings about the formation of new groups of organisms over time	J	Non bio-degradable
		K	Outbreeding
		L	Archeology
1.3.7	Reproduction between organisms from two populations with different gene pools	M	Macro-evolution
		N	Conclusion

7x1=(7)

1.4 Study the following diagrams and answer the questions that follow.



Bones in the forelimbs in two different vertebrates

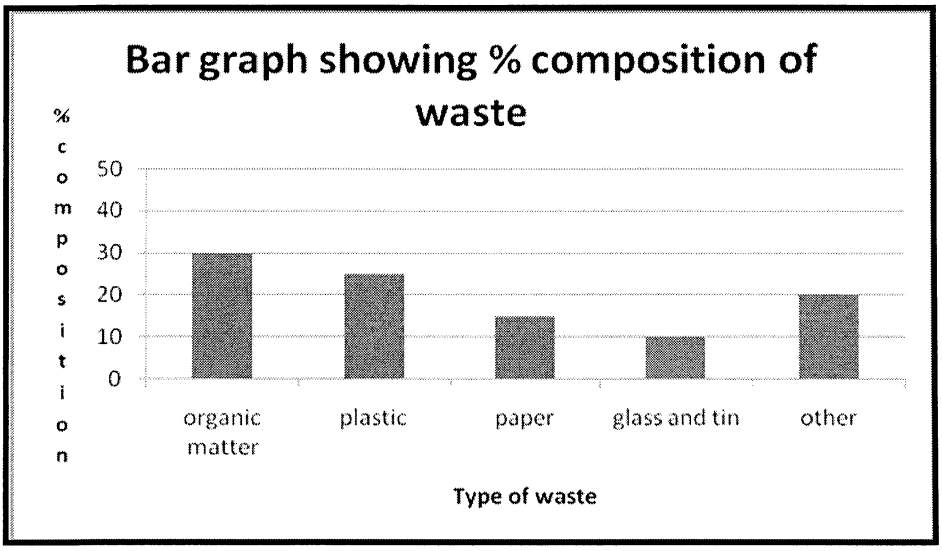
1.4.1 Are the above structures homologous or analogous? (1)

1.4.2 Provide a reason for your answer to Question 1.4.1 above. (2)

1.4.3 How would a scientist use the above diagram to present evidence for evolution? (2)

[5]

1.5 Study the following bar graph and answer the questions that follow.

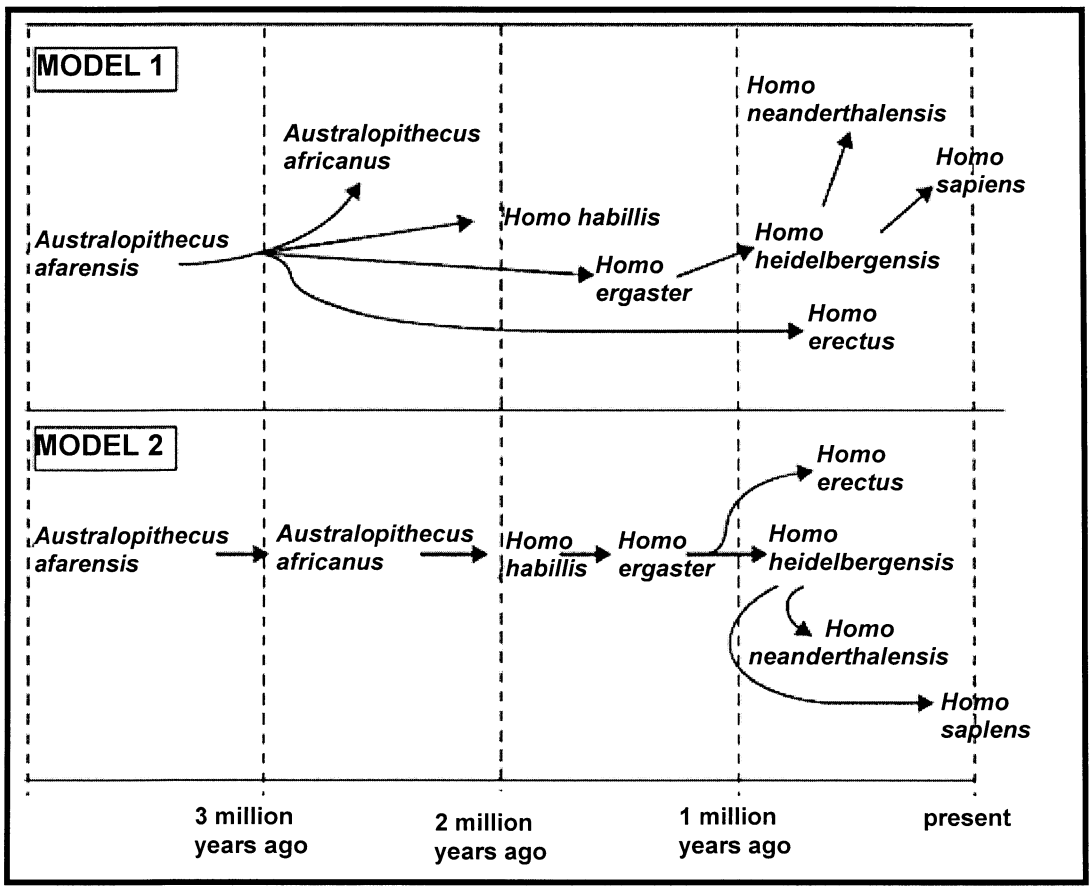


1.5.1 What is the ratio of the percentages of **organic matter** to **glass and tin** in the graph? Show your calculations. (3)

1.5.2 Present the data in the graph above, on organic matter, plastic and other materials, in a table format. (8)

[11]

1.6 Two scientists each used fossil data to draw a model of the human evolutionary tree. The two models they produced are shown below.



1.6.1 Explain how it is possible that the scientists produced different models for the human evolutionary tree. (2)

1.6.2 State TWO features of agreement between the models. (2)

1.6.3 State the feature of conflict between the models concerning *Homo erectus.* (2)

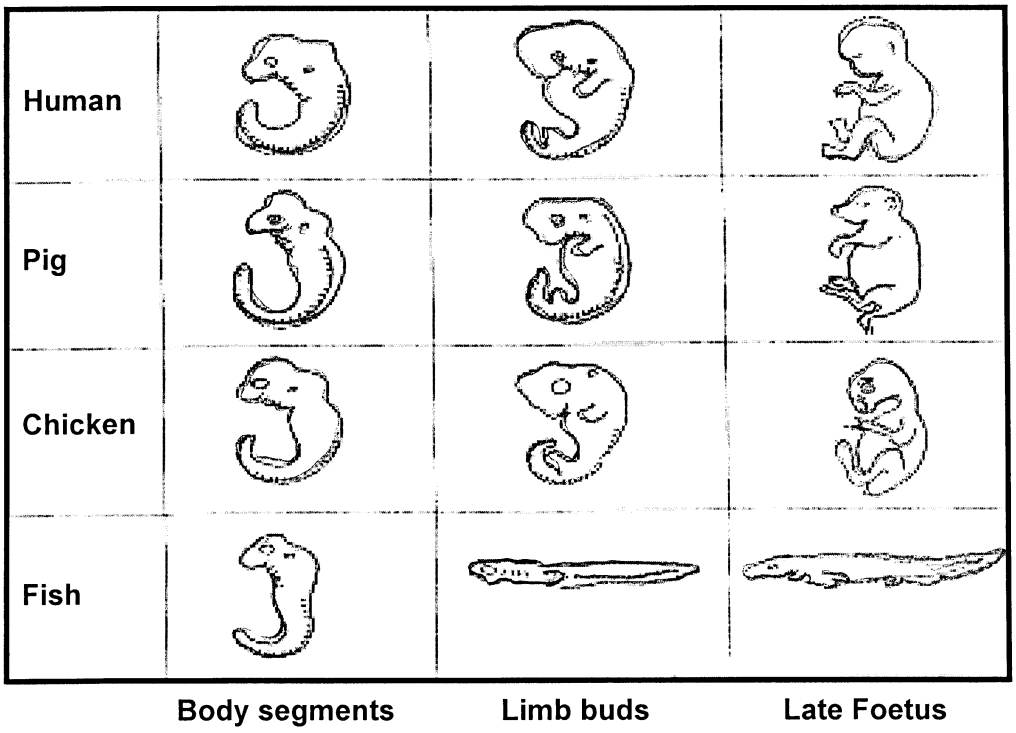
1.6.4 Give TWO structural features of *Homo erectus* that would distinguish it from *Australopithecus afarensis.* (2)
[8]

TOTAL SECTION A: [50]

SECTION B

QUESTION 2

2.1 Study the diagram below that shows the embryos of different vertebrates and answer the questions that follow.

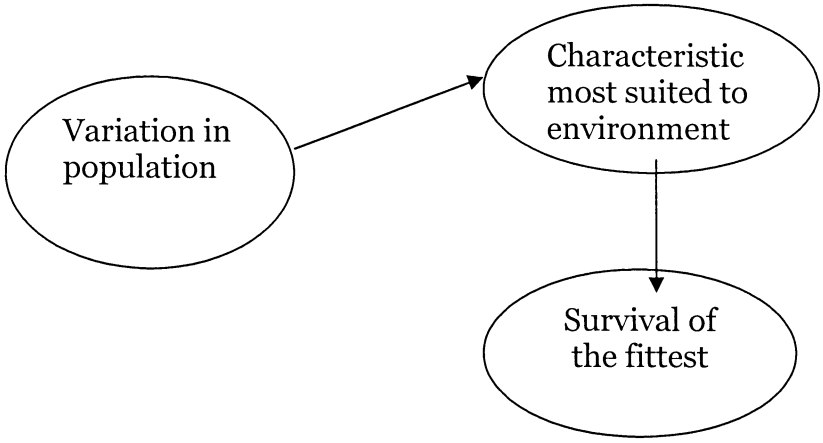


2.1.1 List THREE structural characteristics that are common to all the above vertebrate embryos. (3)

2.1.2 Explain how scientists use the information in the above diagram as evidence for evolution. (2)

2.1.3 Name FOUR other forms of evidence that scientists use as evidence for evolution. (4)

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



2.2.1 What micro-evolution phenomenon/mechanism does the above diagram demonstrate? (1)

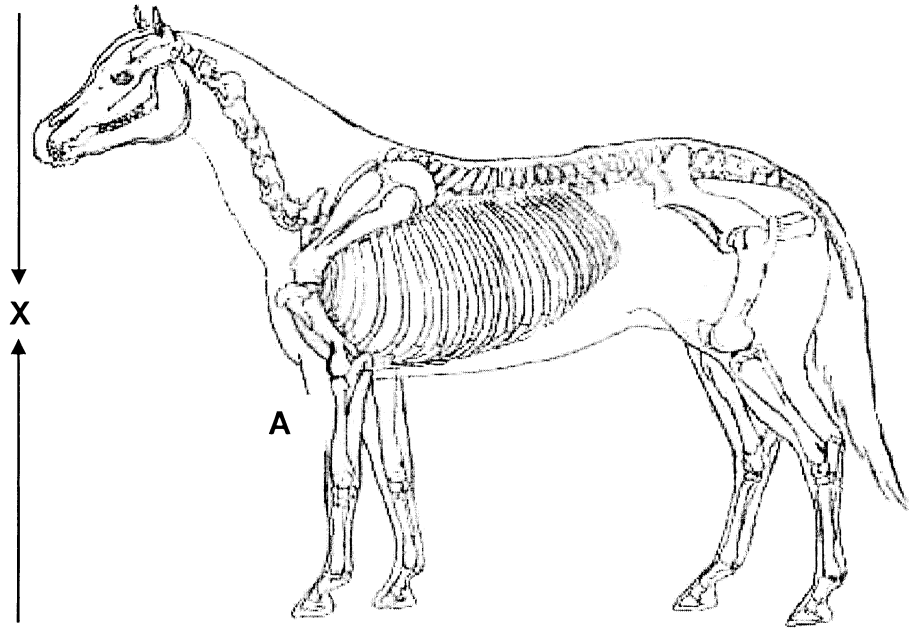
2.2.2 State THREE processes that can cause variations in populations. (3)

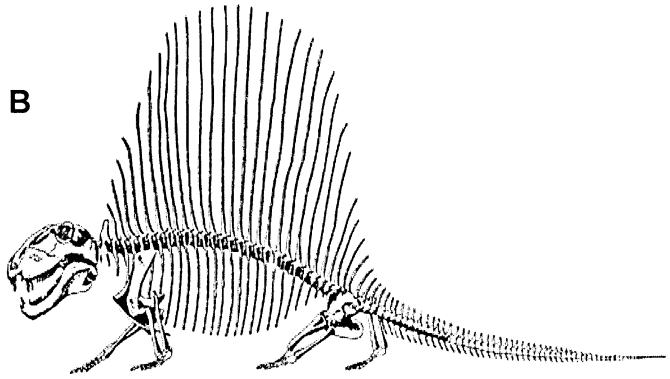
2.2.3 Variation is important to increase the chance of a species for being competitive. Name and distinguish between the TWO types of speciation you have studied. (4)

2.2.4 (i) Which ONE of the types of speciation mentioned in Question 2.2.3 is most common in plants? (1)

(ii) Name ONE way in which speciation may occur in flowering plants. (1)

2.3 Study the representation of the skeleton of a horse, (A) *and* an extinct "mammal like-reptile", the *Dimetrodon* (B).





2.3.1 What feature in the diagram of the *Dimetrodon* suggests that

(a) the *Dimetrodon* still moved like a reptile and not like a mammal? (2)

(b) the *Dimetrodon* has no diaphragm? (2)

2.3.2 Calculate the height marked (X) of the horse, if 10 mm = 0.2 m. (Show all calculations and write the answer in metres.) (4)

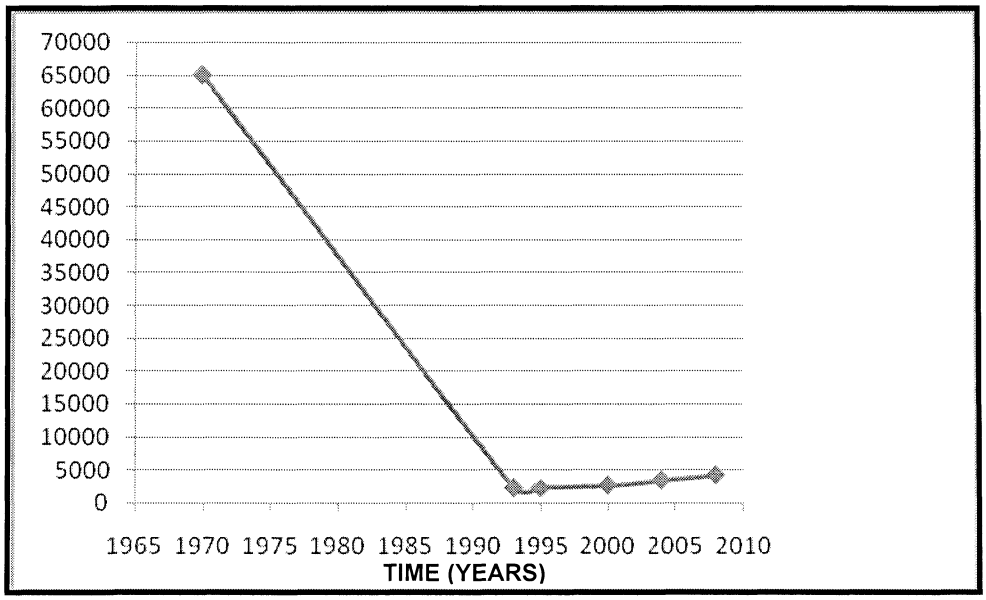
2.3.3 Which organism, A or B, would be able to run faster? Provide TWO reasons for your answer. (3)

[30]

QUESTION 3

3.1 Study the graph below and answer the questions that follow.

Graph showing rhino population from 1970 – 2010



3.1.1 What was the total rhino population in 1970? (1)

3.1.2 Explain the trend in the rhino population from 1970 to 1994. (2)

3.1.3 Provide TWO reasons for the trend explained in Question 3.1.2. (2)

3.1.4 Explain the trend in the rhino population since 1994. (2)

3.1.5 Name ONE global strategy responsible for the trend explained in Question 3.1.4. (2)

3.2 A group of learners visited the harbour to conduct an experiment on the effect of pollution on animals in the Durban Harbour. During their visit they noticed that a large number of birds were affected by pollution and could not swim. The table below shows the information they collected.

REASON BIRDS COULD NOT SWIM	NUMBER OF BIRDS AFFECTED
Covered in oil only	25
Entangled in plastic debris only	10
Covered in oil and entangled by plastic debris	10
Trapped by aluminium cans	5

3.2.1 Name TWO substances the learners identified in the harbour that hamper the swimming ability of the birds. (2)

3.2.2 Which of the observed substances accounts mainly for the birds' inability to swim? (1)

3.2.3 Name THREE measures the learners could take to correct the pollution problem at the harbour. (3)

3.2.4 Explain how EACH of the measures you mentioned in Question 3.2.3 would assist in solving the pollution problem. (3)

3.2.5 Use the data in the table to draw a pie chart showing the proportion of birds affected by the different types of pollutants. Show all calculations. (12)

[30]

TOTAL SECTION B: [60]

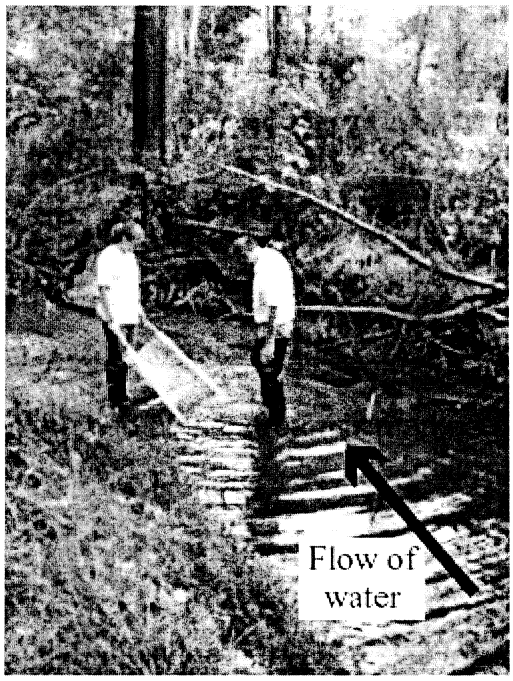
SECTION C

QUESTION 4

4.1 Invertebrates are used to monitor pollution in streams. The photograph shows part of a group of learners, Sameera, Sabeeha, Yaseera and Muhammad collecting a sample of invertebrates from a stream.

Below is the method that they used.

- A 1 m^2 area of the bed of the stream is marked out.
- A net 1 m wide is held by one person on the downstream side of the marked-out area.
- The other person uses their boots to gently move stones in this area of the stream bed.
- They do this for three minutes. This dislodges invertebrates which are then caught in the net.
- The invertebrates are then identified and counted.



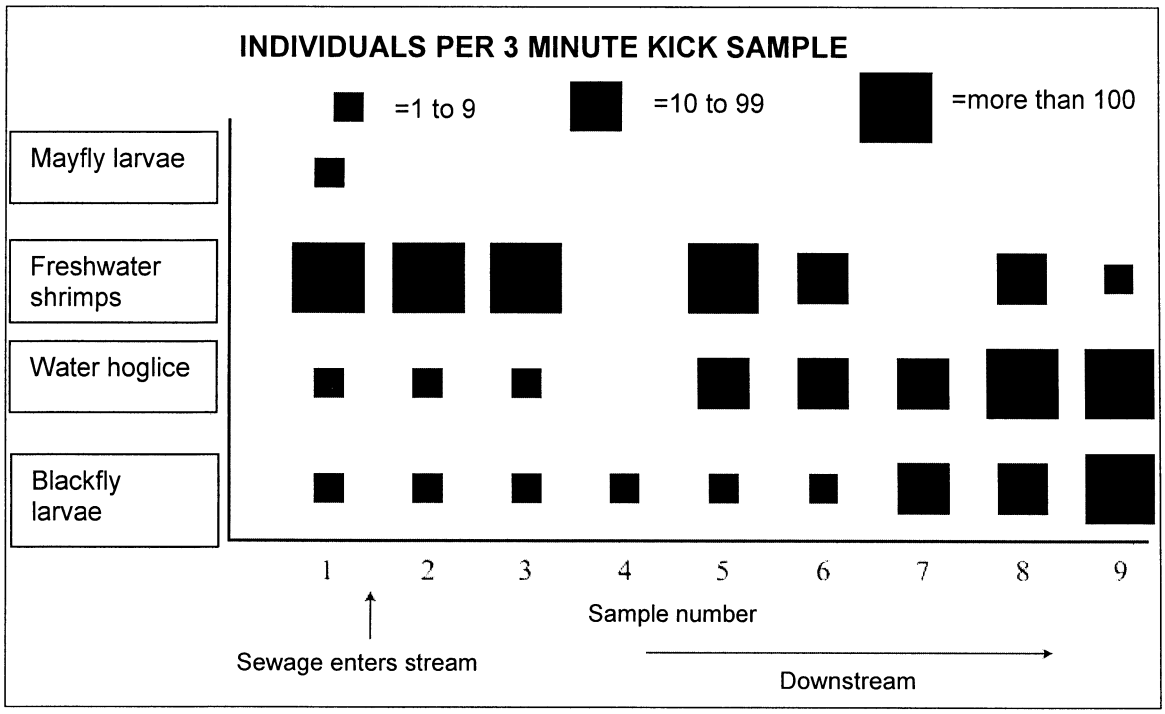
4.1.1 Name TWO variables which must be kept the same in this investigation. (2)

4.1.2 Suggest TWO reasons why the results from a sample might not be accurate. (2)

4.1.3 The technique described on the previous page was used to investigate the effect of sewage pollution on stream invertebrates.

- Sample 1 was taken upstream before the point where the sewage entered the stream.
- Samples 2 – 9 were taken at regular intervals downstream of the sewage inflow.

The graph shows the results.



(i) What was the range of the number of blackfly larvae that could be found in sample 7? (2)

(ii) Describe, as fully as you can, how the number of water hoglice changed downstream from where sewage entered the stream. (4)

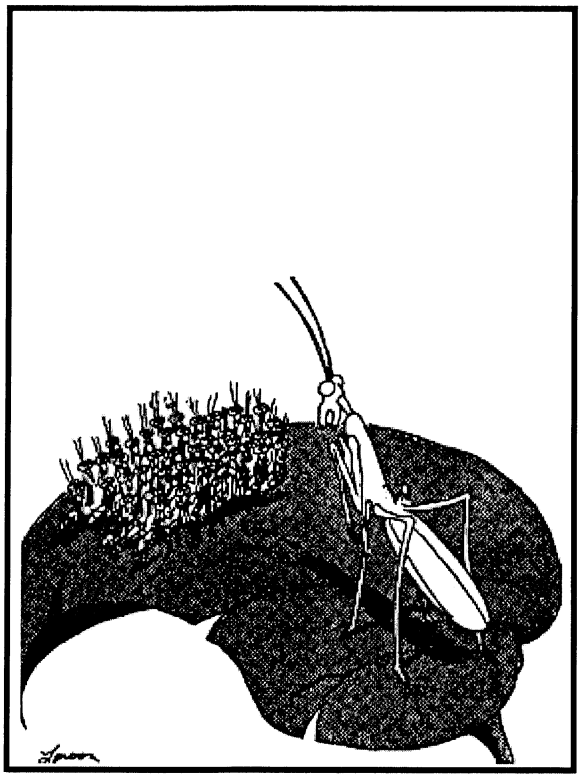
(iii) Which of the four invertebrates is the best indicator species for water which is NOT polluted by sewage? (1)

(iv) Give a reason for your answer to Question 4.1.3 (iii). (2)

(v) Give a possible accepted hypothesis for this investigation with regards to the Blackfly, based on the results shown in the graph. (3)
(16)

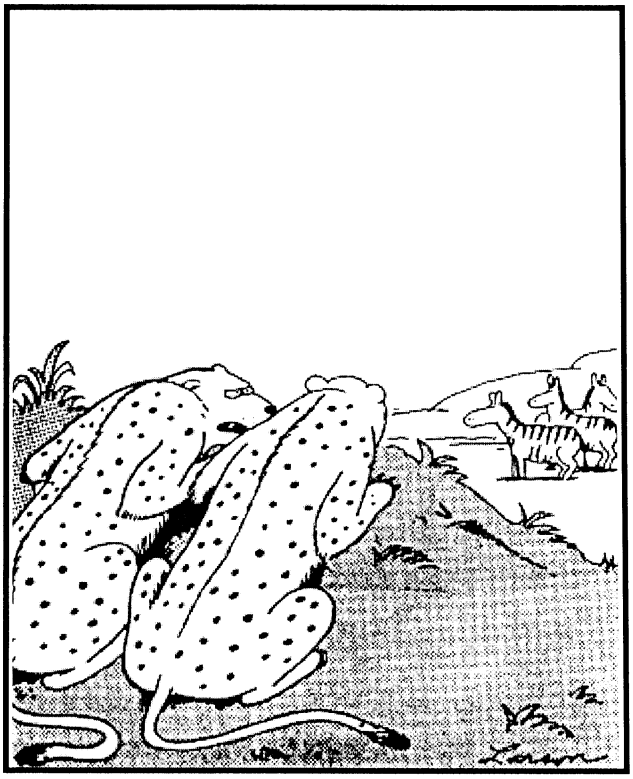
4.2 Study the cartoons below and answer the questions.

A.



"Of course, long before you mature, most of you will be eaten."

B.



"Listen... I'm fed up with this 'weeding out the sick and the old' business... I want something in its prime."

4.2.1 Identify and explain the important Darwinian principle highlighted in cartoon A. (2)

4.2.2 What ecological relationship exists between the two species of animals as shown in cartoon B? (1)

4.3 An archaeologist working on a dig in Kromdraai makes a very exciting discovery of the fossil remains of a human-like skeleton.

4.3.1 State TWO methods he could use to date the skeletal remains. (2)

4.3.2 Provide ONE other clue he would search for in the area around the skeleton to assist in determining the age of the skeleton. (1)

4.4 Through time several major events have occurred resulting in mass extinction.

Explain what is meant by *mass extinction*.

Distinguish between the *Asteroid Impact Theory* and the *Volcano theory*. Discuss the reasons, according to scientists, why each of these events caused mass extinctions.

15 marks are given for factual content and 3 marks are given for the synthesis of your answer. **(18)**

The THREE marks for synthesis are allocated as follows:

MARKS	DESCRIPTION
3	All 3 aspects discussed with no irrelevant information
2	2 aspects only discussed and contains some irrelevant information
1	Discussed 1 aspect only and contains much irrelevant information
0	Not attempted/nothing written other than question number/absolutely no correct information

TOTAL SECTION C: [40]

TOTAL: 150

END