



# education

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Department:  
Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**LIFE SCIENCES P2**

**NOVEMBER 2008**

**MARKS: 150**

**TIME: 2½ hours**

**This question paper consists of 16 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 according to the numbering system used in this question paper.
5. Present your answers according to the instructions of each question.
6. ALL drawings should be done in pencil and labelled in blue or black ink.
7. Draw diagrams or flow charts ONLY when asked to do so.
8. The diagrams in this question paper are NOT all drawn to scale.
9. Do NOT use graph paper.
10. Non-programmable calculators, protractors and compasses may be used.
11. Write neatly and legibly.

**SECTION A****QUESTION 1**

1.1 Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A – D) next to the question number (1.1.1 – 1.1.7), for example 1.1.8 D.

1.1.1 Small changes that occur within a single species can be called ...

- A micro-evolution.
- B ecological succession.
- C out-breeding.
- D selective breeding.

1.1.2 An investigation was undertaken to determine a relationship between asthma and pollution from an oil refinery. Which of the following factors would least affect the investigation?

- A Age of the learners
- B Distance from the oil refinery
- C Gender of the learners
- D Allergy to different food types

1.1.3 The following are all sources of pollution:

- (i) Solid waste
- (ii) Pesticides
- (iii) Sewage
- (iv) Fertilisers

Which of the following combinations contains sources of soil pollution?

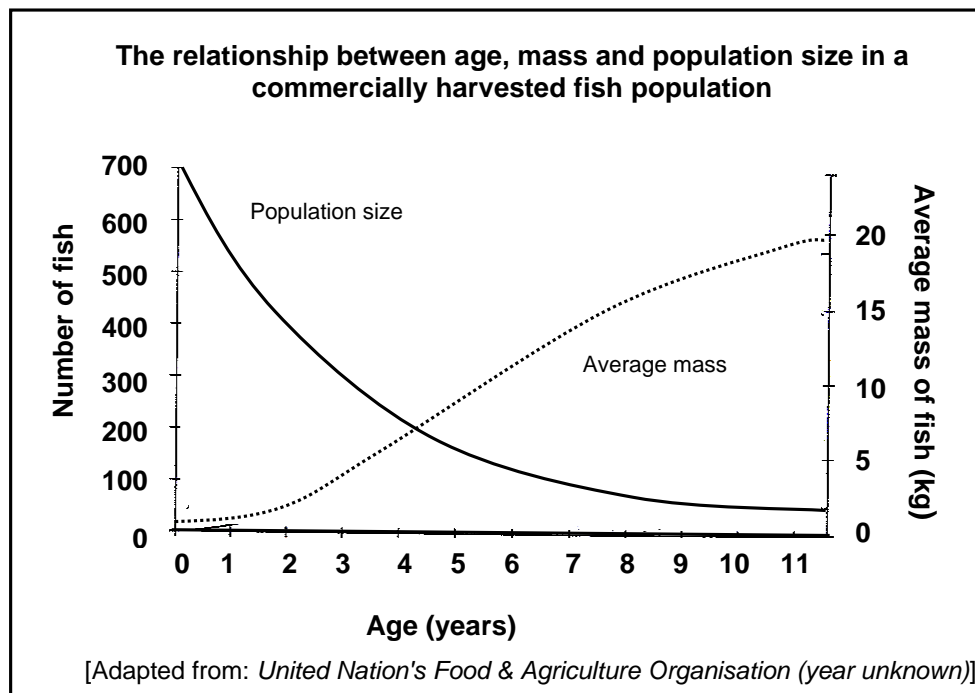
- A (i), (ii) and (iii)
- B (ii), (iii) and (iv)
- C (i), (ii), (iii) and (iv)
- D (ii) and (iv)

1.1.4 Which of the following factors could lead to the extinction of a species?

- (i) Rapid environmental degradation
- (ii) Competition with other species
- (iii) Natality (birth rate)
- (iv) Disease

- A (i), (ii) and (iv)
- B (i), (ii), (iii) and (iv)
- C (ii), (iii) and (iv)
- D (i) and (iv)

QUESTIONS 1.1.5 and 1.1.6 refer to the graph below, taken from the United Nation's Food and Agriculture Organisation (FAO) report.



- 1.1.5 Which of the following represents the age range during which the fish mortality (death) was the greatest?
- A 1 to 3 years
  - B 3 to 5 years
  - C 5 to 7 years
  - D 7 to 9 years
- 1.1.6 To prevent over-exploitation of the fish population, fish should only be harvested after they have reached an average mass of 10 kg. From which age should the fish be harvested?
- A 3,5 years
  - B 4,5 years
  - C 5,5 years
  - D 6,5 years

1.1.7 Which of the following illnesses may be caused by pollution?

- (i) Allergies
- (ii) Asthma
- (iii) Cancer
- (iv) Polio

- A (i), (ii) and (iv)
- B (i), (ii) and (iii)
- C (ii), (iii) and (iv)
- D (i) and (iv)

(7 x 2) (14)

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).

1.2.1 The theory that includes the idea that all continents were originally one big super continent called Pangaea

1.2.2 The non-living factors of an ecosystem

1.2.3 Method of dating fossils by radioactive decay

1.2.4 The study of fossils

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

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

1.2.7 Chemical energy from organisms that lived in the past (7)

- 1.3 Choose an item from COLUMN II that matches a description in COLUMN I. Write only the letter (A – J) next to the question number (1.3.1 – 1.3.6), for example 1.3.7 K.

COLUMN I		COLUMN II	
1.3.1	Walking on two legs	A	genome
1.3.2	Reproduction between organisms from two populations with different gene pools	B	biodegradable
		C	biodiversity
1.3.3	Genes possessed by all members of a population	D	hypothesis
		E	bipedal
1.3.4	A possible explanation to a problem being investigated	F	gene pool
1.3.5	The use of resources in such a way that they are still available for future generations	G	sustainability
		H	outbreeding
1.3.6	The ability of a substance to be broken down into simpler substances by biological processes	I	fragmentation
		J	quadrupedal

(6 x 1 )

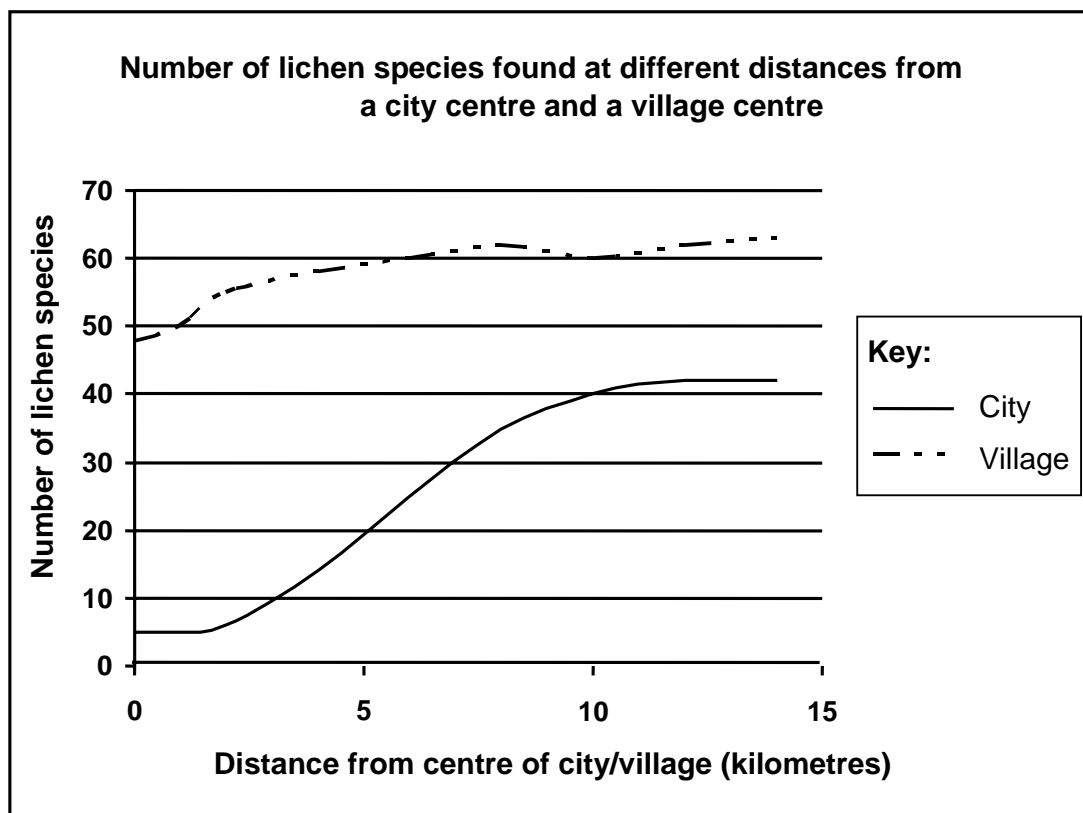
(6)

- 1.4 The table below shows the results of an investigation carried out by learners at five different places (A, B, C, D and E) along a river.

<b>Number of organisms in different water conditions</b>					
<b>River organisms</b>	<b>Condition of River Water</b>				
	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>
	<b>Very clean</b>	<b>Clean</b>	<b>Fairly clean</b>	<b>Dirty</b>	<b>Very Dirty</b>
Green algae	Scarce	Moderate	Many	Abundant	Abundant
Fish (trout)	Many	Scarce	Absent	Absent	Absent
Water weeds	Scarce	Many	Many	Many	Scarce

- 1.4.1 State the hypothesis that the learners set out to investigate. (2)
- 1.4.2 Describe the relationship between the number of green algae and the condition of the river water. (2)
- 1.4.3 Give a reason for the relationship indicated in QUESTION 1.4.2. (2)
- 1.4.4 Write down the letters only of the places in the river where trout were found. (2)
- 1.4.5 Why were trout only found in the places named in QUESTION 1.4.4? (2)

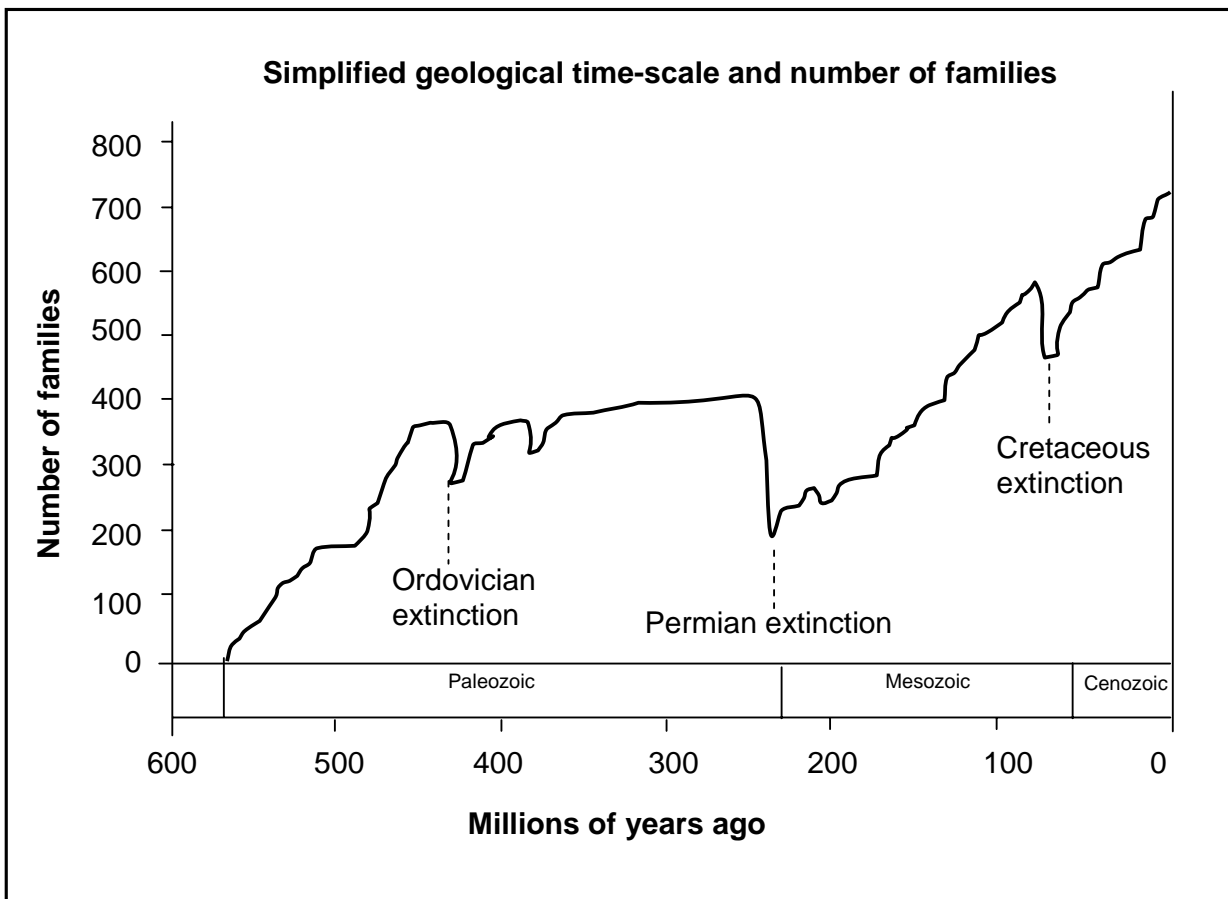
- 1.5 Small organisms called lichens, are affected by pollution in the air. In an investigation, the number of different species of lichen growing on the trunks of trees was counted at different distances from the centre of a city and from the centre of a village. The results obtained are shown in the graph below.



- 1.5.1 How many lichen species were found:
- (a) 5 km from the centre of the city? (1)
- (b) 10 km from the centre of the village? (1)
- 1.5.2 State the dependent variable for this investigation. (1)
- 1.5.3 Describe the relationship between the number of lichen species counted and the distance from the city. (2)
- 1.5.4 Explain your answer to QUESTION 1.5.3. (2)



1.6 The diagram below represents a simplified geological time-scale showing how the number of families (groups of related species) has changed over a period of time.



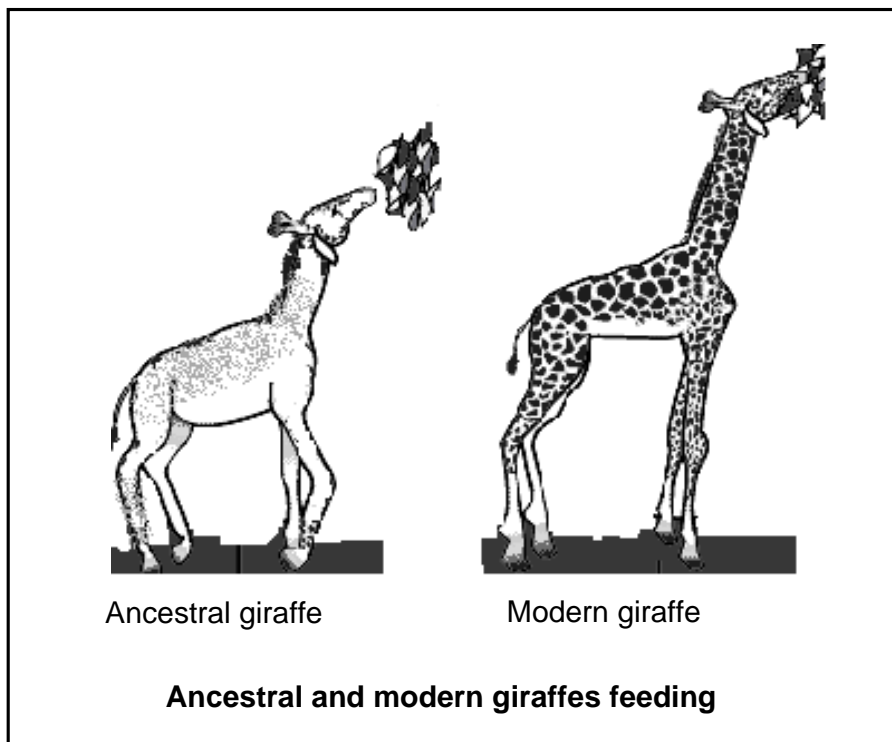
- 1.6.1 When did the Cenozoic era begin? (2)
- 1.6.2 Which mass extinction took place towards the end of the Paleozoic era? (1)
- 1.6.3 Approximately how many families of species died out at the end of the Paleozoic era? Show ALL working. (3)

**TOTAL SECTION A: 50**

**SECTION B**

**QUESTION 2**

2.1 Tens of thousands of years ago, the animals that evolved into giraffes were not as tall as modern giraffes. Over a long period of time, the necks of giraffes became longer. They could reach leaves high in the trees and reach down for water.

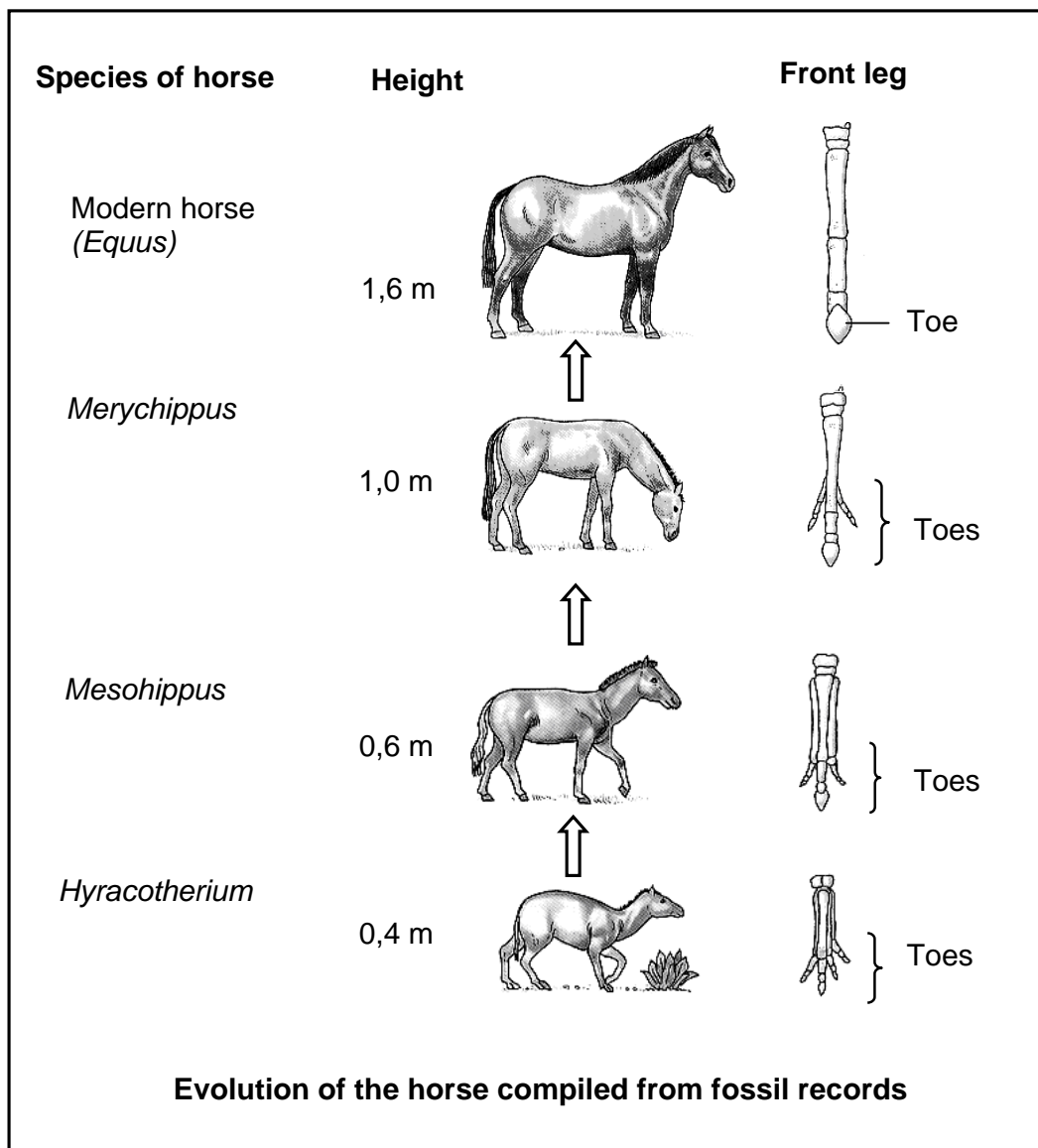


2.1.1 Describe how the long necks of modern giraffes would have been explained by the following:

- (a) Darwin (4)
- (b) Lamarck (4)

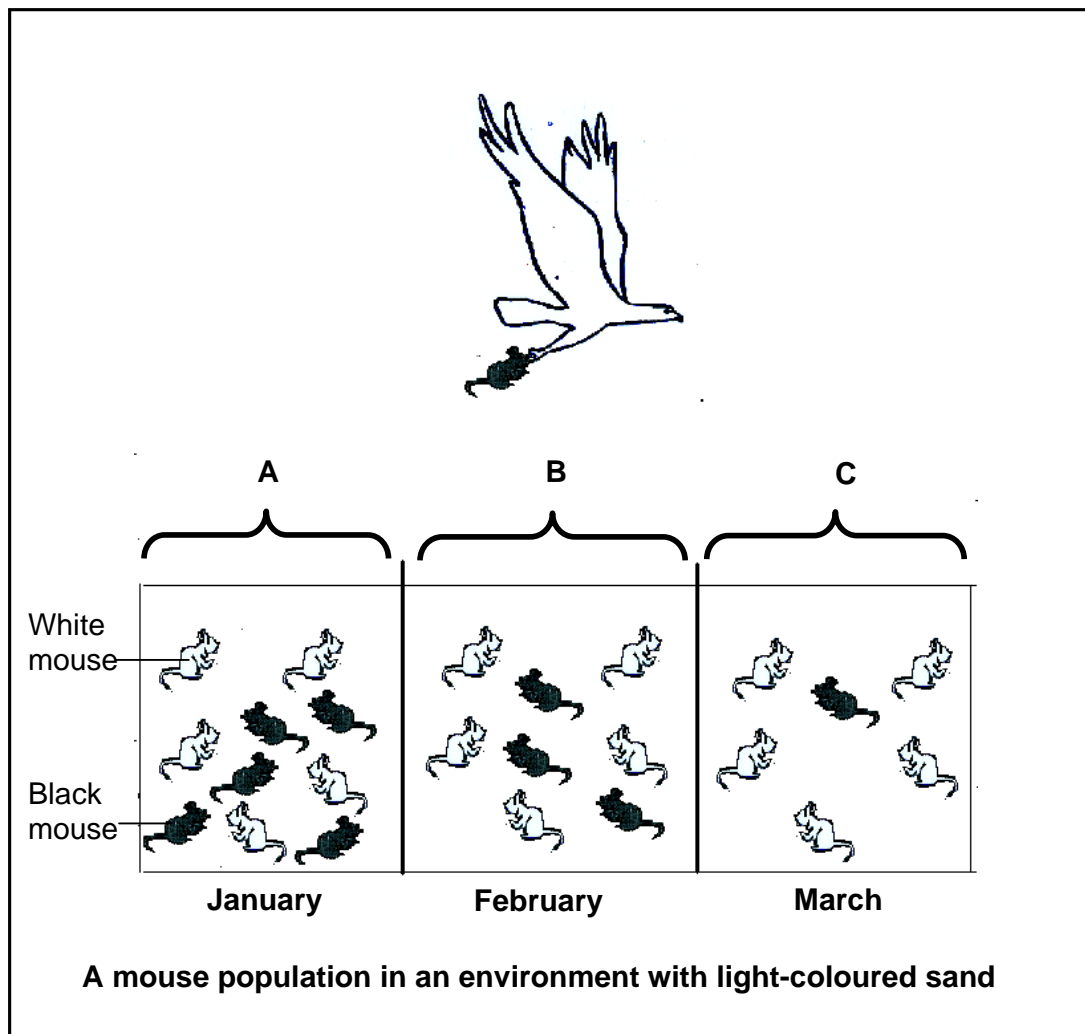
2.1.2 Explain why Lamarck's theory is not accepted. (2)

2.2 The diagrams below represent the evolution of the horse, compiled from fossil records.



- 2.2.1 How many times is the modern horse taller than its earliest ancestor? Show your working. (3)
- 2.2.2 What happened to the appearance of the feet of the horse over time? (2)
- 2.2.3 Palaeontologists suggest that ancient horses lived in forests, but modern horses live in open grassland. Explain ONE way in which the modern horse is adapted to open grassland. (2)

2.3 Study the diagram below that shows the change in numbers of black and white mice living in an environment with light-coloured sand.



2.3.1 What phenomenon is illustrated in the diagram? (1)

2.3.2 Describe how the sequence of events labelled A, B and C represents the phenomenon named in QUESTION 2.3.1. (5)

2.3.3 Will the next generation of mouse population more likely be all white or all black? (1)

2.4 Define the following terms:

2.4.1 Population (3)

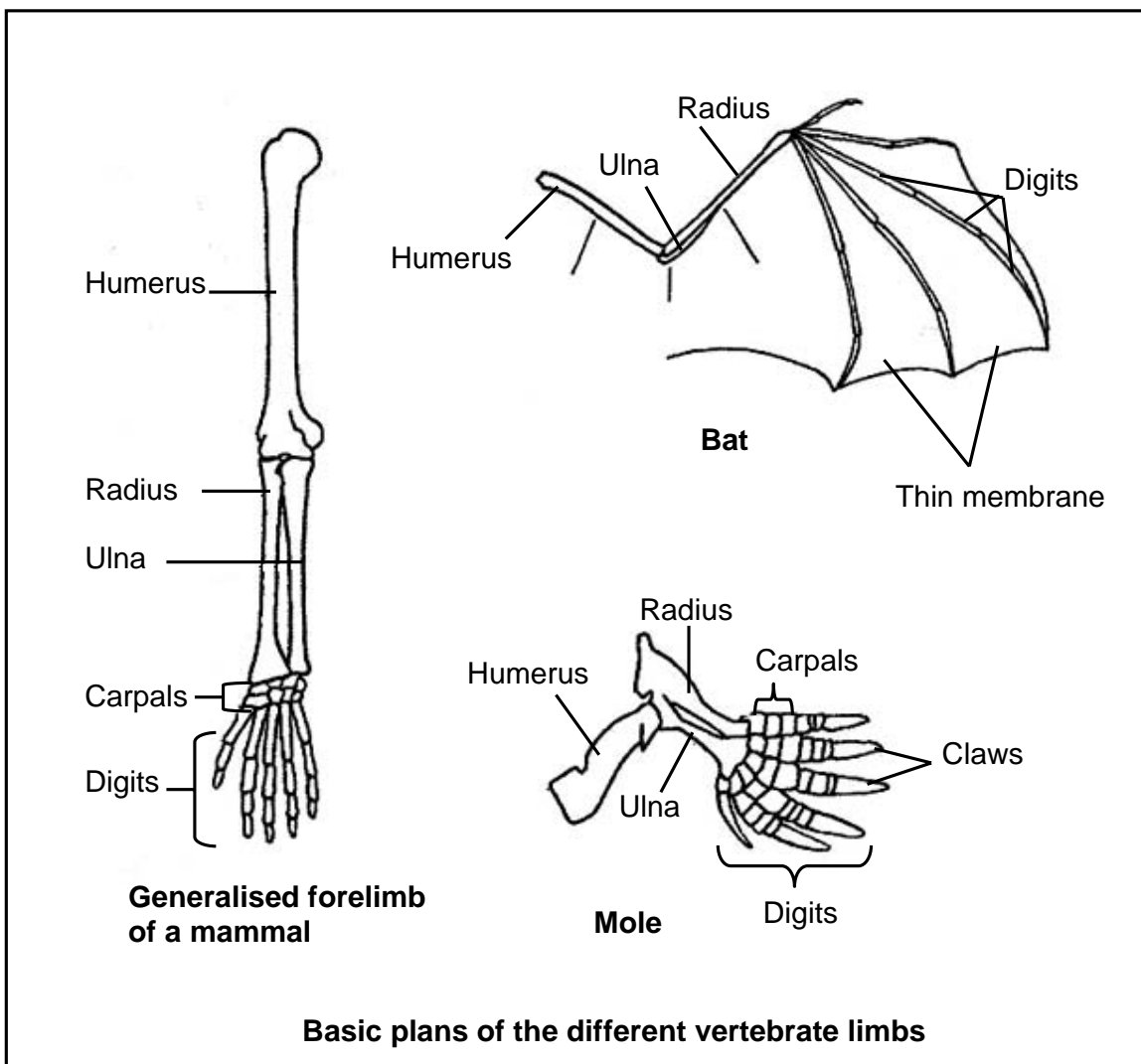
2.4.2 Species (3)

[30]

**QUESTION 3**

- 3.1 The following two questions refer to the characteristics of *Homo sapiens* and other primates.
- 3.1.1 State FOUR structural characteristics of *Homo sapiens* that are similar to other primates. (4)
- 3.1.2 Tabulate FOUR structural differences between the skull of *Homo sapiens* and that of other primates. (9)
- 3.2 State TWO characteristics shown by embryos of different vertebrates that scientists use as evidence that these animals might have a common ancestor. (2)
- 3.3 Scientists believe that variation in populations can lead to the formation of new species.
- 3.3.1 List FOUR sources of variation in populations. (4)
- 3.3.2 Explain how speciation occurs if a population becomes separated into two groups by a geographical barrier such as a mountain. (6)

3.4 Study the basic plans of three different vertebrate limbs shown below.



- 3.4.1 Are the above examples of homologous or analogous structures? (1)
- 3.4.2 Explain your answer to QUESTION 3.4.1. (2)
- 3.4.3 State ONE way in which the forelimbs of the:
- (a) Bat are adapted for flying (1)
  - (b) Mole are adapted for digging holes (1)

[30]

**TOTAL SECTION B: 60**

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

- 4.1 Typhoid only affects humans and is a severe illness that is caused by swallowing water that is contaminated by the bacterium *Salmonella typhi*. When human waste disposal (sewage) systems are inadequate and human faeces contaminate drinking water, it creates perfect conditions for the spread of typhoid.

An investigation was carried out to determine the number of cases of typhoid in a province. The average rainfall per month during the year was also recorded.

The results of the above-mentioned investigation are shown in the table below.

<b>The average rainfall and the number of typhoid cases in one year</b>		
<b>Month</b>	<b>Average rainfall (mm)</b>	<b>Number of cases of typhoid</b>
January	166	22
February	180	27
March	39	13
April	35	12
May	9	10
June	3	5
July	5	2
August	16	4
September	24	10
October	49	13
November	114	15
December	116	16

- 4.1.1 In which month was typhoid most common in this province? (1)
- 4.1.2 Give ONE reason why you think typhoid is a common bacterial disease in South Africa. (2)
- 4.1.3 What is the relationship between the number of cases of typhoid and the average rainfall in the province during the year? (2)
- 4.1.4 Draw a bar graph to show the number of typhoid cases from January to July. (9)
- 4.1.5 Name THREE strategies that can be used to reduce water pollution in our country. (3)

4.2 The following questions refer to exploitation of resources.

4.2.1 State THREE ways in which improved technology has led to over-exploitation of resources in the sea. (3)

4.2.2 Name THREE management strategies that can be employed to reduce over-exploitation of the resources mentioned in QUESTION 4.2.1. (3)

4.2.3 Why should society be concerned about over-exploitation of resources in the sea? (2)

4.3 Study the passage below and answer the questions that follow.

#### **Exploitation of indigenous plants**

There are many research projects in South Africa which use indigenous plants to reduce poverty. These projects create new ways of generating income.

As long as these projects continue without a plan that promotes sustainable use of resources, there is a high risk that indigenous plants may be over-exploited for medicinal and nutritional purposes. The over-harvesting of the African potato is an example of a threat to indigenous plants.

Write a mini-essay in which you describe at least FOUR ways in which over-exploitation of indigenous plants impacts on the environment. Explain FOUR appropriate management strategies that can reduce such over-exploitation.

(12)

Synthesis:

(3)

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

**TOTAL SECTION C: 40**

**GRAND TOTAL: 150**