



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P2

VERSION 2 (OLD CONTENT) FOR PART-TIME CANDIDATES

NOVEMBER 2012

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 answers 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. Present your answers according to the instructions at each question.
6. Do ALL drawings in pencil and label them 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. You must use a non-programmable calculator, a protractor and a compass when necessary.
11. Write neatly and legibly.

SECTION A

QUESTION 1

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

1.1.1 There is little fossil evidence of the earliest forms of life because the organisms ...

- A did not have hard parts which would fossilise easily.
- B evolved so quickly that they left few remains.
- C lived in water and were not preserved.
- D decayed quickly in the oxygen-rich atmosphere.

1.1.2 Deforestation by a forestry company leads to a reduction in biodiversity. Why should society be concerned about this decrease?

- A A greater biodiversity increases the chance of climate change.
- B The forest food chains would be longer.
- C Some of the organisms that were lost may have been of future use.
- D There may be an increased use of herbicides in the area.

1.1.3 The table below shows the number of differences in the amino acid sequence of the protein albumin in four species of primates.

Species of primates	Monkey	Gibbon	Gorilla	Human
Human	32	14	8	0
Gorilla	32	14	0	
Gibbon	32	0		
Monkey	0			

Which two species are likely to have separated most recently according to the results on the table?

- A Humans and monkeys
- B Gorillas and gibbons
- C Gibbons and monkeys
- D Gorillas and humans

1.1.4 Which of the combinations below refer to the sources of variation in a population?

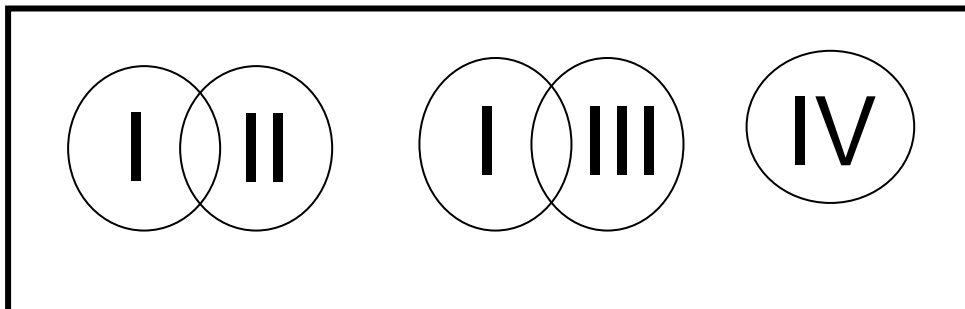
- (i) Random fusion of gametes during reproduction
- (ii) Crossing over during meiosis
- (iii) Random assortment of chromosomes during meiosis
- (iv) Natural selection in a population

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

1.1.5 After the publication of a scientist's results, other scientists repeated his investigation. What is the correct scientific reason for repeating the investigation? Other scientists ...

- A want to improve accuracy.
- B want to increase reliability of the results.
- C did not believe the original results.
- D did not understand the results.

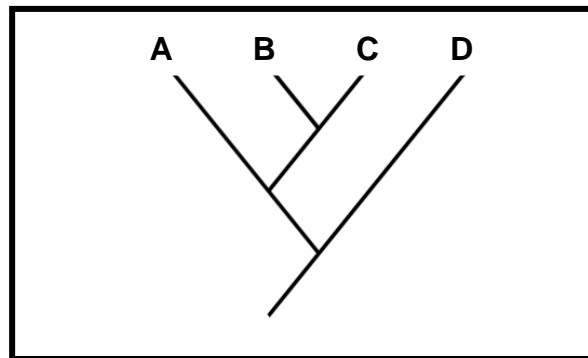
1.1.6 The numbers I, II, III and IV below refer to four populations of frogs. These populations are represented diagrammatically by circles. Overlapping circles show populations that are capable of interbreeding to produce fertile offspring.



It would be reasonable to conclude that ...

- A if population II were to die out, there would be two different species remaining.
- B populations I, II, III and IV represent four different species.
- C if population II and IV were to die out, there would be two different species remaining.
- D if population III were to die out, there would be only one species remaining.

- 1.1.7 From the cladogram below which statement is CORRECT about the relationships between **A**, **B**, **C** and **D**?



- A B and C are the most closely related.
- B A is more closely related to B than to C.
- C A and B are the most closely related.
- D A and B are the least related.

(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 to 1.2.6) in the ANSWER BOOK.

- 1.2.1 The use of resources in such a way that they are still available for future generations
- 1.2.2 The present-day distribution of similar organisms
- 1.2.3 Numerous interacting food chains that show the feeding relationships in an ecosystem
- 1.2.4 Species living in a habitat in which they are not naturally found
- 1.2.5 The ability of a substance to be broken down into simpler substances by biological processes
- 1.2.6 Non-living factors in an ecosystem

(6)

- 1.3 Indicate whether each of the statements in COLUMN I applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **both A and B** or **none** next to the question number (1.3.1 to 1.3.8) in the ANSWER BOOK.

COLUMN I	COLUMN II
1.3.1 Natural resource(s) in South Africa	A: Rooibos tea B: Hoodia
1.3.2 The study of ancient humans and their cultural activities	A: Palaeontology B: Anthropology
1.3.3 The disease(s) caused by air pollution	A: Typhoid fever B: Bilharzia
1.3.4 The results of an increase in the amount of carbon dioxide in the atmosphere	A: Global warming B: Acid rain
1.3.5 Produces offspring similar to the parents	A: Inbreeding B: Outbreeding
1.3.6 Substance(s) that can be recycled and reused	A: Glass B: Coal
1.3.7 The causes of overexploitation of some resources	A: Poverty B: Medicinal purposes
1.3.8 Dating of fossils by comparing the age of one fossil to another	A: Absolute dating B: Relative dating

(8 x 2)

(16)

- 1.4 Untreated sewage accidentally leaked into a river. Environmental health officers did an investigation to determine the effect of sewage outflow at various distances from the outlet.

The percentage of dissolved oxygen in water was measured and the number of organisms were counted at various distances from the sewage outlet.

The results were as follows:

DISTANCE FROM SEWAGE OUTLET (m)	% OF DISSOLVED OXYGEN	NUMBER OF ORGANISMS PRESENT		
		Rat-tailed maggots	Sludge worms	Water lice
0	0	20	36	0
50	10	8	20	0
100	25	0	10	46
150	30	0	5	40
200	34	0	0	24

- 1.4.1 Provide the caption for the data in the table. (3)
- 1.4.2 Which organisms survive better in the following:
- (a) Oxygen-deficient water (1)
- (b) The highest amount of dissolved oxygen (1)
- 1.4.3 What is the relationship between the distance from the sewage outlet and the percentage of dissolved oxygen present? (2)
- 1.4.4 Name TWO factors that the environmental health officers could have kept constant during this investigation. (2)
- 1.4.5 State ONE way in which the researchers could increase the reliability of their results. (1)
- (10)**

1.5 The diagram below represents a typical food chain in an ocean.

Algae → Small fish → Big fish → Great white shark

1.5.1 If the small fish become extinct, what would happen to the population size of the following:

(a) Algae (1)

(b) Great white sharks (1)

1.5.2 Explain your answer in QUESTION 1.5.1 (b). (2)
(4)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

- 2.1 The table below represents a South African geological time scale as proposed by Dr John Almond.

TIME Million years ago (mya)	ERA	PERIOD	MOST PREVALENT FOSSILS OF THE TIME
Current	Cenozoic	Quaternary	Hominids
1,75		Neogene	Langebaan vertebrates
24		Paleogene	
65	Mesozoic	Cretaceous	5th mass extinction (<i>meteorite impact in Mexican Gulf</i>) Zululand ammonites
125		Jurassic	Kirkwood dinosaurs
203		Triassic	4th mass extinction Karoo dinosaurs and mammals 3rd mass extinction Karoo mammal-like reptiles
251		Permian	
295	Palaeozoic	Carboniferous	Witteberg fish and plants
355		Devonian	2nd mass extinction Bokkeveld shelly fauna
410		Silurian	
440		Ordovician	1st mass extinction Table mountain trace fossils
500		Cambrian	Stromatolites
545	PRECAMBRIAN		Barbeton mountain petrified bacteria

[Modified from original by Dr John Almond, *Natura Viva* cc, 2006]

- 2.1.1 Which fossils were most prevalent 440 mya? (1)
- 2.1.2 In which period were the fossils of the Kirkwood dinosaurs the most prevalent? (1)
- 2.1.3 Explain the implication on the understanding of human evolution if a hominid fossil which dates about 435 mya could be found. (3)
- 2.1.4 In which period would the hominid fossil mentioned in QUESTION 2.1.3 belong? (1)
- 2.1.5 Describe how the proposed hypothesis of a meteorite impact led to the extinction of dinosaurs. (5)
- (11)**

- 2.2 The graph below shows the results of an experiment done to investigate the average time that fruit flies can survive without food (starvation resistance). The average starvation resistance time is when 80 per cent of the population has died out.

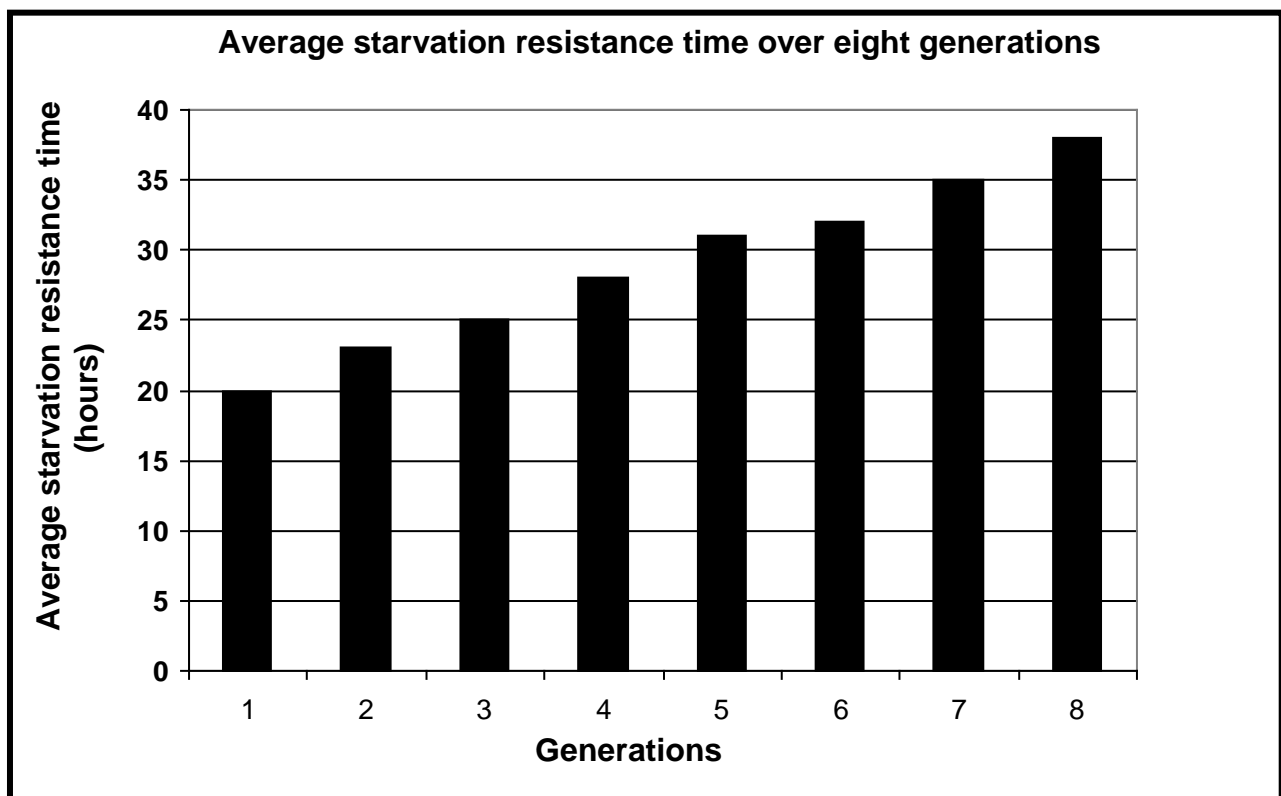
The researcher placed 5 000 fruit fly offspring from the same generation in a large container without food. The average starvation resistance time was recorded.

The eggs from the container were collected, transferred to a new container and allowed to hatch (2nd generation). The average starvation resistance time was recorded. The procedure was repeated until the 8th generation.

- 2.2.1 Identify the dependent variable in the investigation. (1)

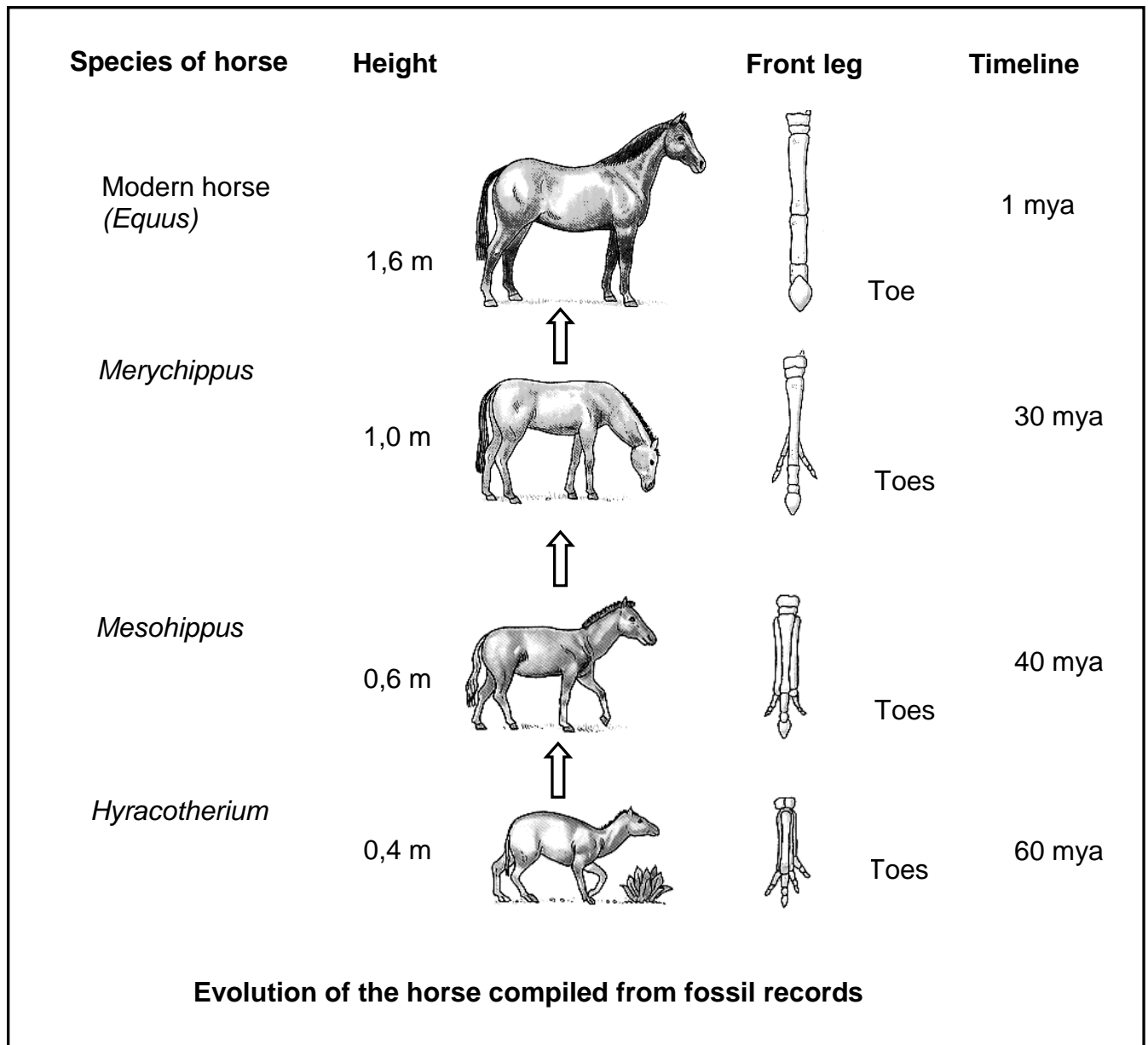
- 2.2.2 State TWO factors that should have been kept constant during the investigation. (2)

The results of the first 8 generations in the investigation were as follows:



- 2.2.3 In terms of natural selection, explain why the average starvation resistance time of the fruit flies is different in each generation. (5)
(8)

- 2.3 The diagrams below show the evolution of horses over time as they moved from muddy ground to grassland.



- 2.3.1 How long did it take to evolve from the average height of 0,6 m to the present average height? (2)
- 2.3.2 What would have been the advantage of tall height as the environment changed to grassland? (2)
- 2.3.3 How many times did the height of the horse increase over the years as shown in the diagrams above? (1)
- 2.3.4 Describe how Lamarck would have explained how the horses lost their toes. (4)
- 2.3.5 Explain why Lamarck's ideas are not accepted in the science community today. (2)

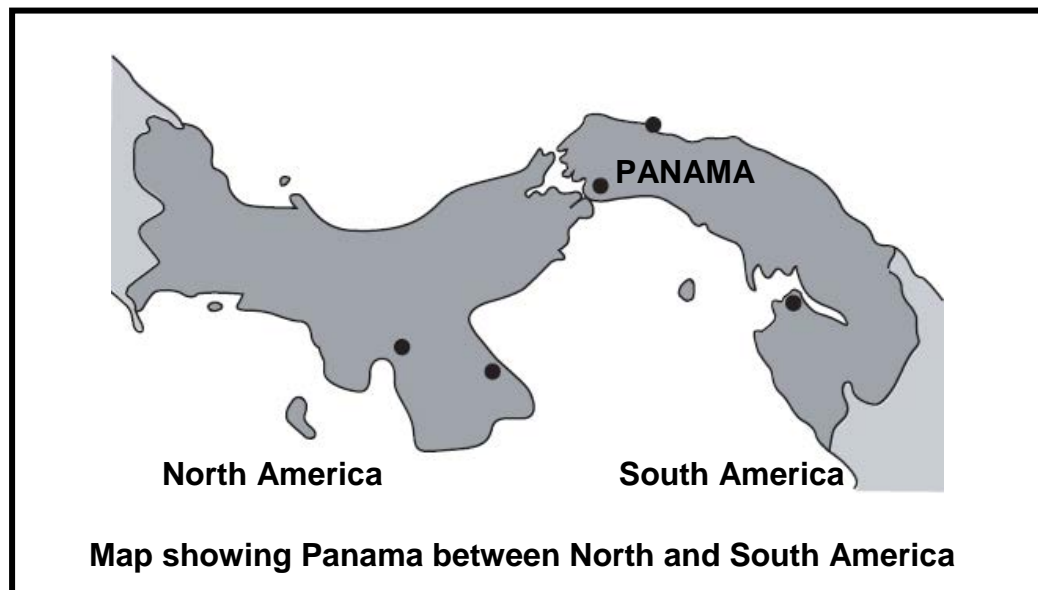
(11)
[30]

QUESTION 3

3.1 Read the passage below and answer the question that follows.

Panama is a narrow strip of land that joins North and South America. This narrow strip of land formed approximately 3 million years ago.

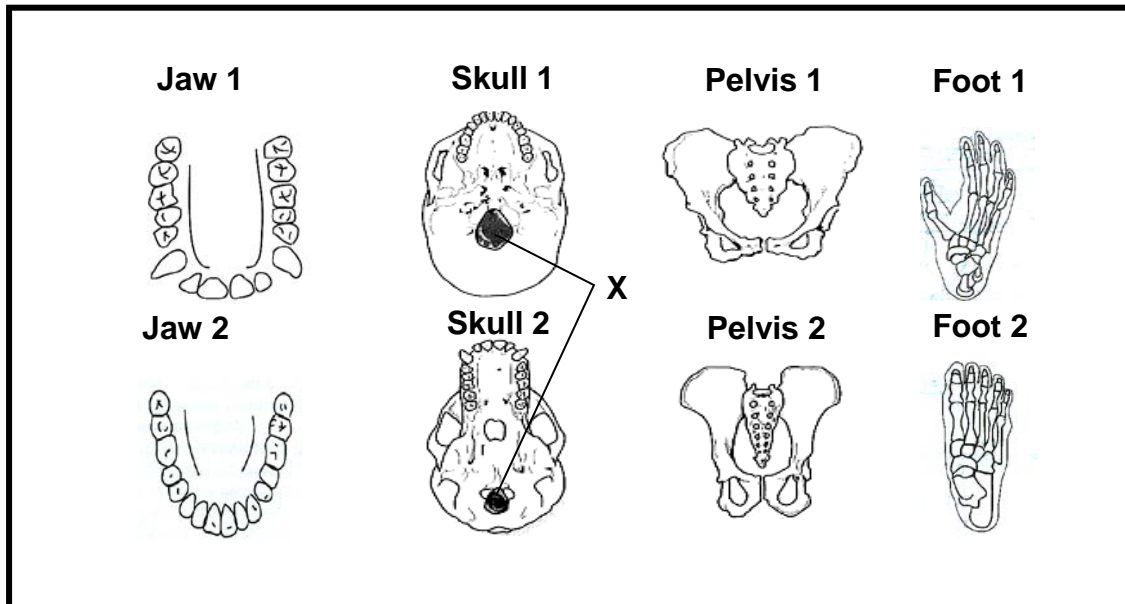
Shrimps (sea organisms), genus *Alpheus*, can be found on either side of Panama. The two groups are phenotypically similar. However, when the males and females from either side of the narrow strip were brought together, they were not able to mate. They are now considered to be two different species.



Describe how this kind of speciation could have taken place to form two different species.

(8)

- 3.2 The diagrams below represent some of the parts found in two different organisms (organism A and organism B). Study them and answer the questions that follow.



- 3.2.1 Redraw the table below and use the information in the diagrams above to match the characteristics of the different parts (1 and 2) from the diagram that belong to each organism.

Characteristic	Organism A	Organism B
Jaw		
Pelvis		
Foot		
Skull		

(8)

- 3.2.2 Which pelvis (1 or 2) represents that of a non-human primate?

(1)

- 3.2.3 Identify the structure marked X.

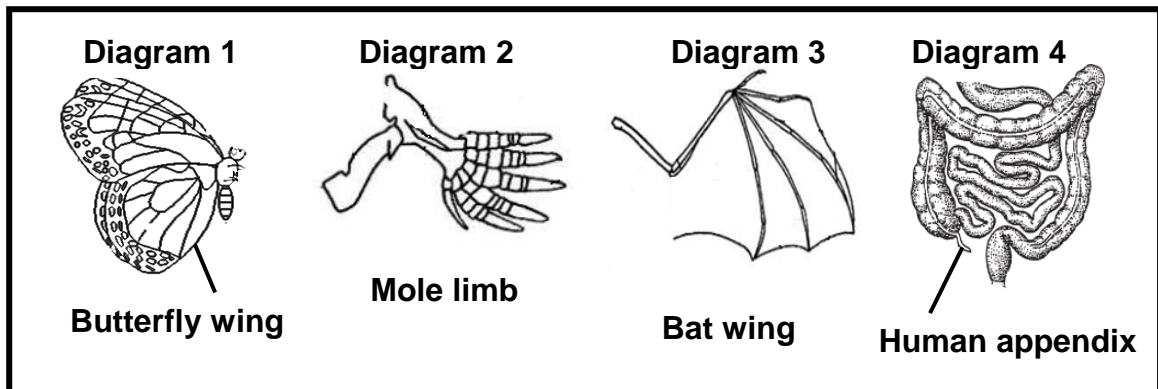
(1)

- 3.2.4 Explain how the structure mentioned in QUESTION 3.2.3 has changed to explain evolutionary trends in primates.

(3)

(13)

3.3 Study the diagrams below and answer the questions that follow.



- 3.3.1 (a) Which diagrams represent structures that are analogous? (1)
 (b) Which diagrams represent structures that are homologous? (1)
- 3.3.2 Give a reason for your answer to QUESTION 3.3.1(a). (2)
- 3.3.3 (a) Identify the diagram that has a vestigial structure. (1)
 (b) Explain why it is called a vestigial structure. (2)
 (c) Describe how vestigial structures are used as evidence for evolution. (2)
- (9)**
[30]

TOTAL SECTION B: 60

SECTION C

QUESTION 4

- 4.1 Despite a great increase in the demand for food, only 7% more land is now needed for farming. One of the reasons for this increased productivity of food is a higher yield per hectare, due to the use of fertilisers and pesticides.

4.1.1 Describe how the use of pesticides could destroy food chains. (2)

4.1.2 Describe how fertilisers cause eutrophication when they are washed into rivers. (5)
(7)

- 4.2 State THREE management strategies that a municipality can use to reduce carbon dioxide pollution. (3)

- 4.3 The table below shows the statistics concerning rhino poaching in South Africa from 2005 until April 2012. Study it and answer the questions that follow.

YEAR	NUMBER OF RHINOS POACHED/YEAR
2005	13
2006	24
2007	13
2008	83
2009	122
2010	333
2011	448
2012 (until end April)	181

[Department of Environmental Affairs (DEA), April 2012]

- 4.3.1 Draw a line graph to present the data in the table above from 2005 until 2011. (9)

- 4.3.2 What is the estimated number of rhinos that were killed every month in 2011? (1)

- 4.3.3 How many rhinos will be killed by the end of August in 2012 if the estimated rate per month up to April 2012 remains the same? Show all working. (3)

- 4.3.4 State TWO uses of rhino horns. (2)
(15)

4.4 A Western Cape game reserve owner injected the horns of two female rhinos with a chemical containing three substances in a bid to prevent poaching. The three substances used in the experiment were:

1. A dye that penetrates inside the horn and makes the horn look pink
2. A substance that make the horns visible on a scanner (type of X-ray machine that makes wrapped objects visible)
3. A chemical substance called barium, that would make anyone who consumes the product made from rhino horns mildly ill

Explain THREE reasons against and THREE reasons for the use of the method used above to prevent rhino horn poaching.

Content	(12)
Synthesis	(3)
	(15)

TOTAL SECTION C:	40
GRAND TOTAL:	150