education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P2

FEBRUARY/MARCH 2009

MARKS: 150

TIME: 2½ hours

This question paper consists of 14 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. 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 answer and write only the letter (A – D) next to the question number (1.1.1 – 1.1.5), for example 1.1.6 D.

1.1.1 Most scientists agree that the number of mass extinctions that have occurred in the history of life on Earth is …

A 3.
B 7.
C 6.
D 5.

1.1.2 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.

1.1.3 The following conditions are proposed as being most favourable for fossil formation:

(i) Organisms should have a hard skeleton or shell
(ii) Micro-organisms must be present
(iii) The dead body must be covered by sediment fairly quickly
(iv) Little or no oxygen must be present

Which of the following combinations is correct?

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

1.1.4 Possible measures for the reduction of air pollution would NOT include the following:

A Providing subsidies for solar panels
B Providing subsidies for truck drivers
C Rewards for cleaner production by industries
D Improving the public transport system

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. (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 – 1.2.5) in the ANSWER BOOK.

1.2.1 A diagram that shows possible evolutionary relationships between groups of organisms

1.2.2 The non-living factors of an ecosystem

1.2.3 The control of a pest by using another kind of organism/species

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

1.2.5 The study of ancient humans and their cultures (5)

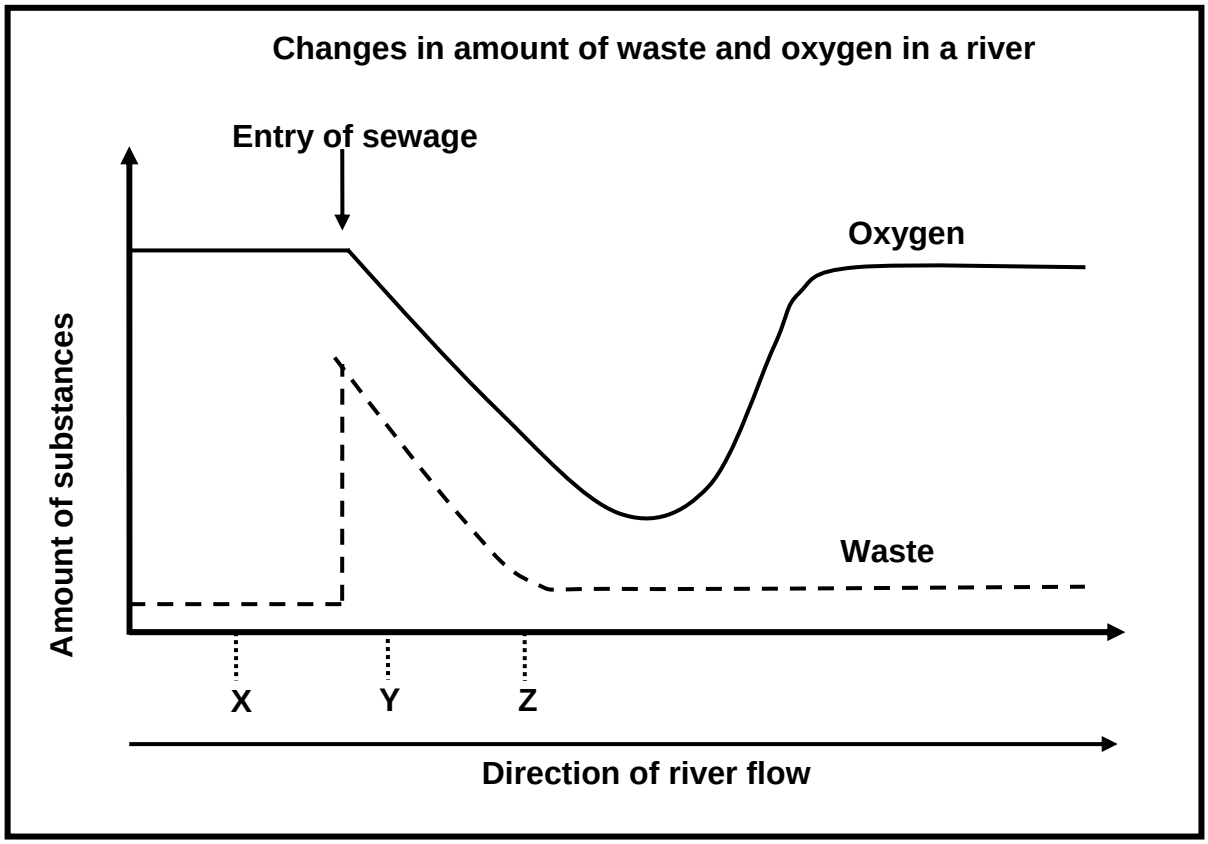
1.3 Choose an item from COLUMN II that matches a description in COLUMN I. Write only the letter (A – J) next to the question number (1.3.1 – 1.3.6) in the ANSWER BOOK, for example 1.3.7 K.

COLUMN I		COLUMN II	
1.3.1	The appearance of new taxa such as genera, families and orders	A	analogous
1.3.2	A list of organisms that are threatened with extinction	B	non-biodegradable
1.3.3	Proposed the 'law' of use and disuse to support his theory of evolution	C	sustainability
1.3.4	Structures that have similar functions and appearance but have different origins	D	speciation
1.3.5	The use of resources in such a way that they are still available for future generations	E	biodegradable
1.3.6	Materials that do not decompose by the action of micro-organisms	F	Lamarck
		G	Darwin
		H	red data list
		I	homologous
		J	macro-evolution

(6 x 1) (6)

1.4 A group of learners collected water samples at different places (**X, Y** and **Z**) along the same river to compare the level of substances (oxygen and waste) as well as the organisms present.

The graph below shows the changes in the amount of substances (waste and oxygen) in the water along the course of the river. The point at which sewage enters the river is indicated.



The presence or absence of certain animal species can be used as indicators of the degree of water pollution in a river, as shown below:

ORGANISM PRESENT	DEGREE OF WATER POLLUTION
Mayfly nymph	unpolluted
Leeches	moderately polluted
Sludge worms	severely polluted

1.4.1 Which organism (listed in the table) would most likely have been present at:

(a) **X** (1)
(b) **Y** (1)
(c) **Z** (1)

1.4.2 State TWO factors that should be kept constant while collecting the water samples. (2)

1.4.3 Explain TWO precautions that the learners should take to ensure their own safety while collecting the samples. (4)

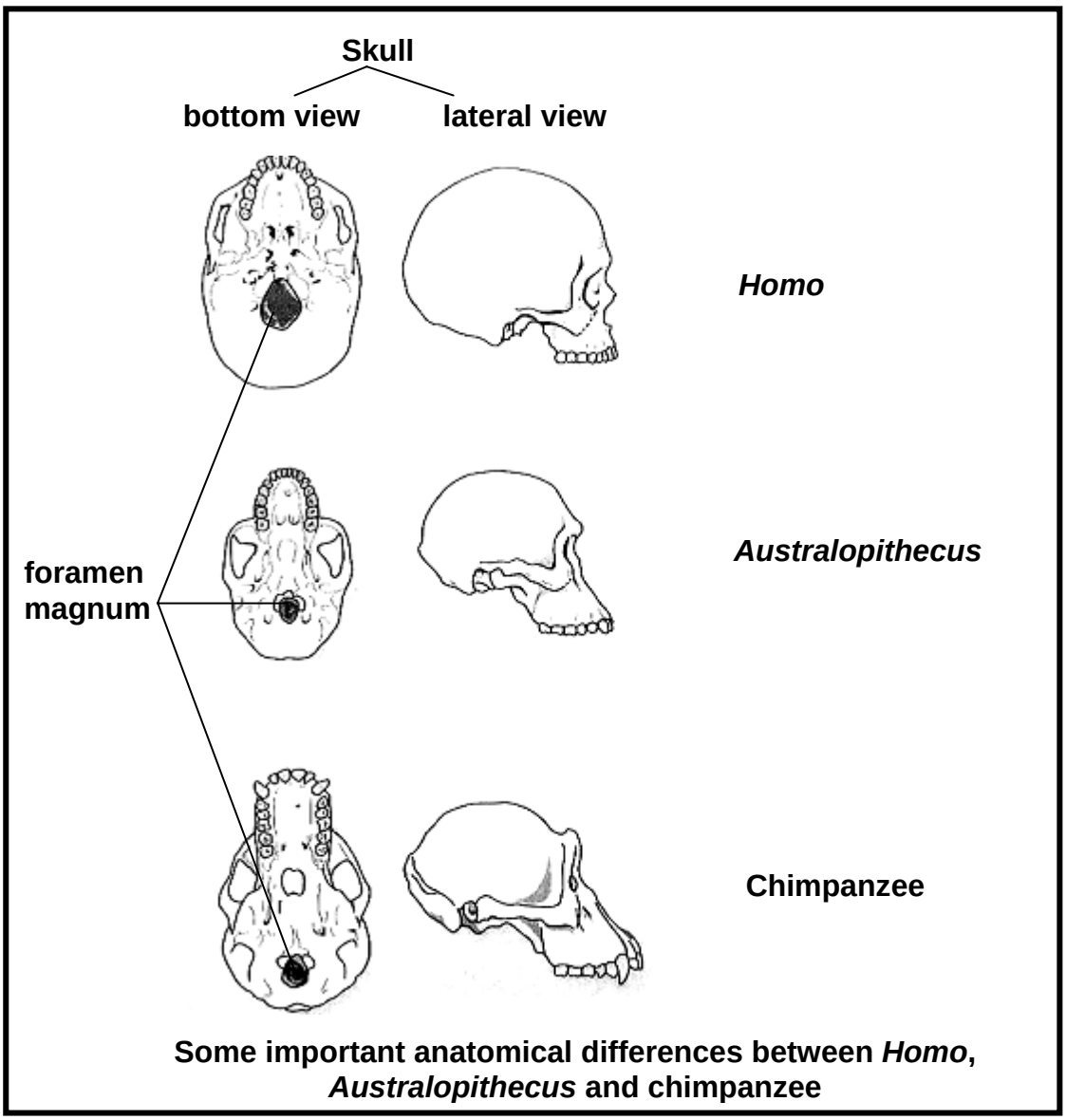
1.4.4 Name ONE dependent variable in this investigation. (1)

1.4.5 Use the graph to describe the relationship between the amount of oxygen and the amount of waste from the point of entry of sewage. (4)

1.4.6 Explain why the oxygen level is highest in region **X**. (2)

1.4.7 State TWO ways in which the degree of water pollution caused by sewage can be reduced. (2)

1.5 A comparison of the anatomical features of organisms has helped scientists to propose evolutionary relationships.



Some important anatomical differences between *Homo*, *Australopithecus* and chimpanzee

1.5.1 Tabulate THREE observable differences between the side view of the skulls of *Homo* and the chimpanzee. (7)

1.5.2 Which ONE of the organisms (*Australopithecus* or chimpanzee) is/was a quadruped? (1)

1.5.3 Give ONE observable reason for your answer to QUESTION 1.5.2. (1)

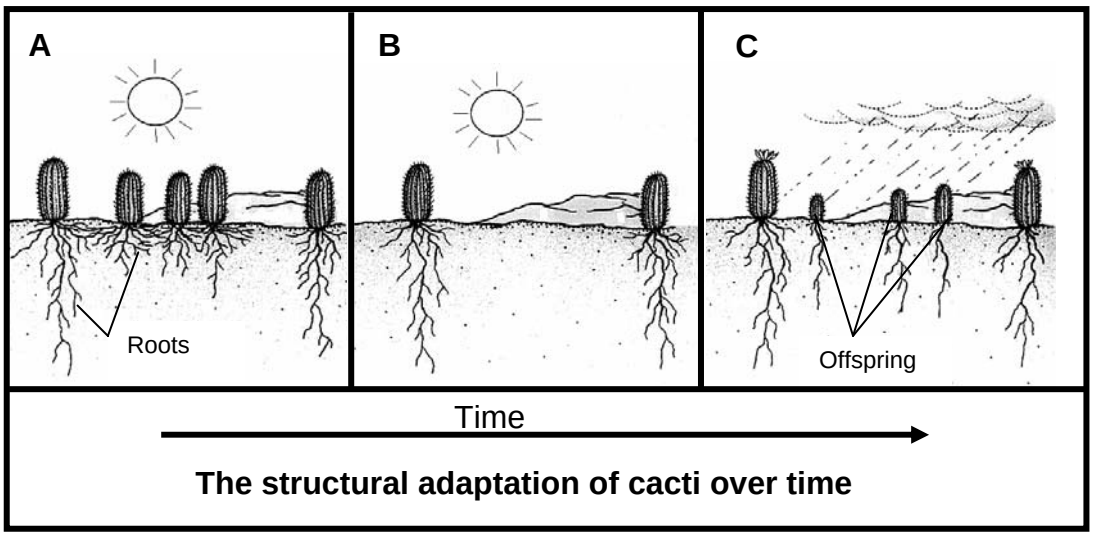
1.5.4 Name TWO fossils of *Australopithecus* found in South Africa. (2)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 Study the three diagrams (A, B and C) below that show a mechanism used to explain evolution.



The structural adaptation of cacti over time

2.1.1 From a comparison of pictures A and B, describe the feature of the cacti that have enabled them to survive long periods of hot, dry weather conditions. (1)

2.1.2 Name the mechanism put forward by Darwin to explain his theory of evolution that is illustrated in these diagrams. (1)

2.1.3 Use the three diagrams above to explain the mechanism mentioned in QUESTION 2.1.2. (5)

2.2 Describe how each of the following contributes to genotypic variation within a species:

2.2.1 Meiosis (6)

2.2.2 Mutation (2)

2.2.3 Sexual reproduction (4)

2.3 Describe how speciation occurs when a population becomes separated by a geographical barrier. (5)

2.4 The dinosaurs became extinct nearly 65 million years ago.

2.4.1 What evidence do scientists use to show that dinosaurs once existed on Earth? (1)

2.4.2 State how scientists have come to the conclusion that the period that dinosaurs existed was between 65 and 245 million years ago. (1)

2.4.3 Describe the extra-terrestrial theory that is proposed by scientists as a possible cause of the extinction of the dinosaurs. (4)
[30]

QUESTION 3

3.1 The following table shows the total amount of solid waste and the amount of recyclable material dumped in a South African city landfill site over a number of years.

YEAR	TOTAL AMOUNT OF SOLID WASTE (MILLIONS OF TONS)	AMOUNT OF RECYCLABLE MATERIAL IN SOLID WASTE (MILLIONS OF TONS)
2003	1,49	0,78
2004	1,59	0,82
2005	1,80	1,20
2006	1,93	1,30

3.1.1 Describe the general trend in the total amount of waste produced and the amount of recyclable materials dumped from 2003 to 2006. (2)

3.1.2 Explain TWO advantages of recycling. (4)

3.2 The table below shows the composition of household waste from a community.

TYPE OF WASTE	PERCENTAGE COMPOSITION
Organic matter	30
Plastic	25
Paper	15
Glass and tin	10
Other	20

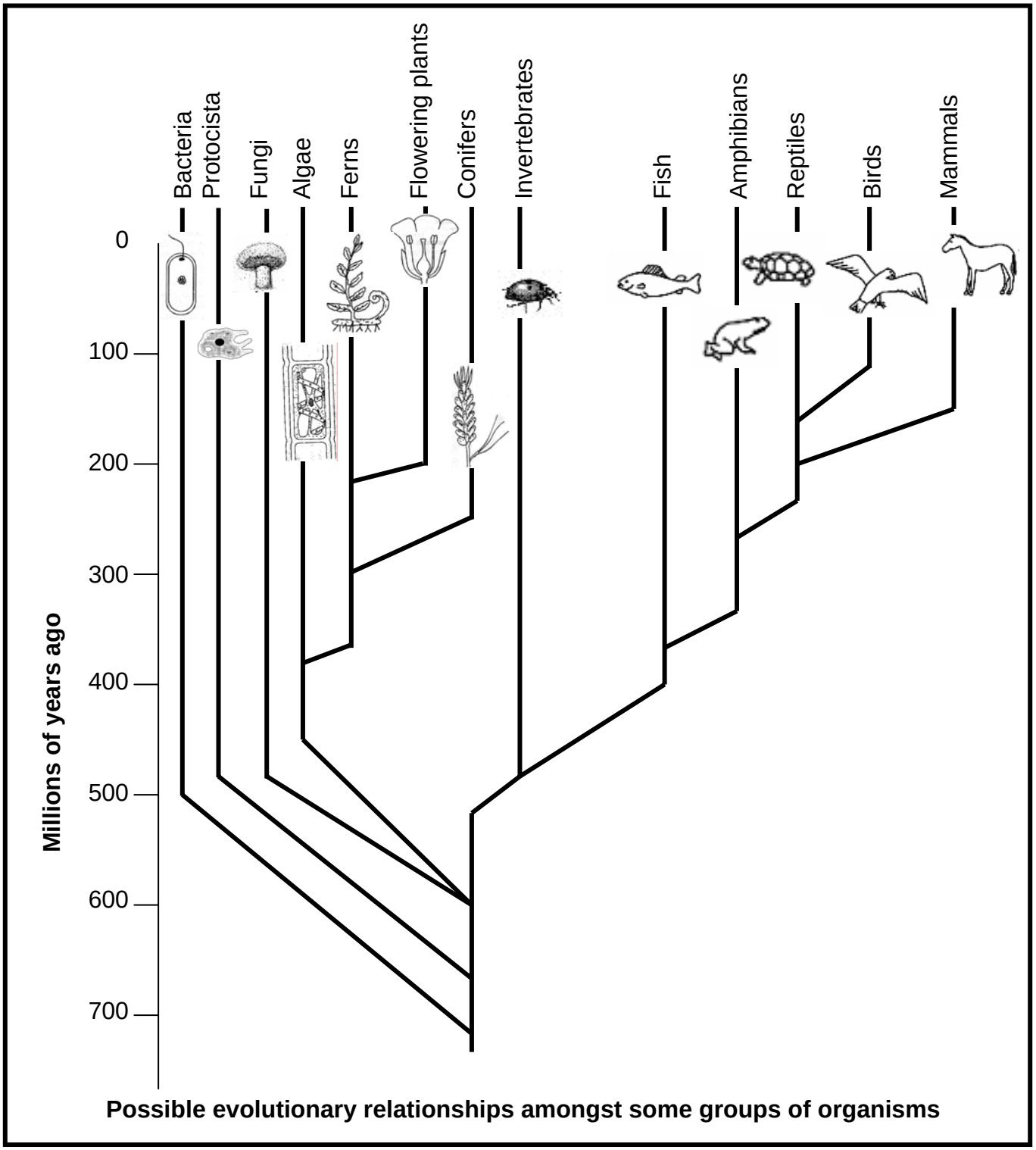
Draw a pie chart to represent the data in the table above. Show ALL working. (12)

3.3 Modern farming techniques often include the use of fertilisers to increase crop production.

3.3.1 Name the mineral that is normally included in such fertilisers, which is needed by plants for the formation of all amino acids. (1)

3.3.2 Explain ONE danger of the excessive use of fertilisers to the environment. (3)

3.4 Study the diagram showing possible evolutionary relationships amongst some groups of organisms.



Possible evolutionary relationships amongst some groups of organisms

3.4.1 According to the diagram:

(a) How many million years ago did the conifers evolve? (1)
(b) Which were the first organisms that lived on Earth? (1)
(c) From which group of animals did the reptiles evolve? (1)
(d) Which is the most recent group of animals to evolve? (1)

3.4.2 Name TWO fields of study, other than embryology and biochemistry, that scientists may have used to propose the evolutionary relationships shown in the diagram. (2)

3.4.3 Explain why we cannot be sure that the evolutionary relationships displayed in the diagram in QUESTION 3.4 are absolutely correct. (2)

[30]

TOTAL SECTION B: 60

SECTION C

QUESTION 4

4.1 Read the text below and answer the questions which follow.

OVER-FISHING OF COD

One of the most important species of fish caught for food in the North Sea is cod. They live in shoals, are active hunters and feed on other fish, such as herring, and on squid. Cod only begin to breed when they are about 3 to 4 years old. By this time they are about 50 cm long. Unfortunately over-fishing of cod is slowly reducing the cod population.

4.1.1 Explain TWO consequences to the ecosystem if the cod population becomes extinct. (4)

4.1.2 Explain THREE management strategies that could be employed by the countries around the North Sea to prevent the cod population from becoming extinct. (6)

4.1.3 Explain ONE problem that could result from any of the management strategies that you described in QUESTION 4.1.2. (2)

4.2 *Homo* species are characterised by having opposable thumbs and by being bipedal.

4.2.1 State ONE possible advantage of having an opposable thumb. (1)

4.2.2 Explain TWO possible advantages of bipedalism. (4)

4.3 Scientists have used information from various fields of science to provide evidence for evolution.

4.3.1 List THREE aspects of comparative biochemistry that provides evidence for evolution. (3)

4.3.2 State TWO pieces of evidence from comparative embryology that have led scientists to believe that all vertebrates may have a common ancestor. (2)

4.4 Critically endangered cheetah populations are found in small remote areas in South Africa, East Africa, West Africa and Asia. This leads to inbreeding with its many associated problems.

4.4.1 Explain ONE way in which outbreeding would reduce the problems associated with inbreeding. (2)

4.4.2 State ONE advantage of inbreeding. (1)

4.5 The disposal of solid wastes is a major problem in most cities in South Africa.

Write a mini-essay to describe any TWO disadvantages in disposing of solid waste in landfill sites as well as TWO advantages and TWO disadvantages of solid waste disposal by means of burning (incineration). (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