education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P2

ADDITIONAL EXEMPLAR 2008

MARKS: 150

TIME: 2½ hours

This question paper consists of 15 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 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 and flow charts ONLY when asked to do so.
8. The diagrams in this question paper may not necessarily be 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) in the ANSWER BOOK, for example 1.1.8 D.

1.1.1 Which of the following would probably occur if all the primary consumers were removed from a closed ecosystem?

A Producer population will decrease
B Secondary consumer population will increase
C Carnivore population will decrease
D Herbivore population will decrease

1.1.2 Which ONE of the following is an example of a pair of analogous structures?

A A whale's flipper and a bat's wing
B A bird's wing and an insect's wing
C A hawk's wing and a sparrow's wing
D A dog's leg and a horse's leg

1.1.3 A natural population of plants can be sustainably used if …

A the community members can collect enough to feed their families.
B the community members are able to sell whatever they collect.
C recovery of the plant population occurs so that plants can be harvested in future.
D it does not harm the tourist potential of the area.

1.1.4 Macroevolution is a term that describes …

A an increase in the size of individuals of a population over a long period of time.
B the process by which new genera and families of organisms are formed.
C a gradual change in the number of species found in the fossil record.
D changes that can be seen without the need for a microscope.

1.1.5 Which of the following are all degradable waste products?

A Rubber, glass, cow manure
B Plastic, metal, glass
C Grass cuttings, cardboard, egg shells
D Glass, wooden chair, old batteries

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

1 Poverty and shortage of food
2 Use of indigenous plants for medicinal purposes
3 Use of wood to generate heat energy

A 1 and 3
B 1 and 2
C 2 and 3
D 1, 2 and 3

1.1.7 Pollutant gases have an adverse effect on the environment and on our health. The amounts of these gases have been steadily increasing over the years.

The table below shows the source and amount of some pollutant gases produced by human activities.

POLLUTANT GAS	SOURCE	AMOUNT PRODUCED PER YEAR (MILLIONS OF TONNES)
Carbon monoxide	Vehicle exhausts	350
Sulphur dioxide	Burning coal and oil, industry	200
Nitrogen oxide	Vehicle exhaust	55
Hydrocarbon	Vehicle exhaust, industry	90

Which ONE of the following statements is correct?

A 150 million tonnes of nitrogen oxide is produced.
B Carbon monoxide is produced by industry.
C Sulphur dioxide is produced by vehicle exhaust.
D Carbon monoxide is the gas produced in the largest amount.

(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) in the ANSWER BOOK.

1.2.1 Chemicals used to kill insects

1.2.2 The method used to determine the age of fossils

1.2.3 The simultaneous elimination of large numbers of species on a worldwide scale

1.2.4 The term used to indicate the variety of living organisms on earth

1.2.5 The release of harmful substances into the environment

1.2.6 Development that meets the needs of the present without compromising the ability of future generations to meet their own needs

1.2.7 Carbon-based minerals such as oil and coal which release heat energy during combustion (7)

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

COLUMN I		COLUMN II	
1.3.1	A study of the distribution of flora and fauna in different parts of the world	A	palaeontology
1.3.2	Results from an increased carbon dioxide concentration in the atmosphere	B	natural resources
1.3.3	Lung disease caused by a type of air pollution	C	biotic factors
1.3.4	The study of fossils	D	biogeography
1.3.5	A change in the structure of a gene	E	dysentery
1.3.6	Food, water and living space	F	mutation
		G	global warming
		H	asbestosis

(6 x 1) (6)

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

CHARLES DARWIN

In 1831 Charles Darwin set out on a trip around the world in the HMS Beagle. At the Cape Verde Islands, he saw the fossil remains of sea creatures in the cliffs, many metres above sea level.

The unique forms of life he found on the Galapagos Islands, such as the giant tortoises, convinced him that living organisms had evolved over many millions of years. He noticed that these tortoises were quite different from those found elsewhere in the world. Each island also had a distinct type of tortoise, differing in the shape of the shell and mating behaviour.

1.4.1 Explain how Darwin would have used the example of the tortoises to explain speciation. (4)

1.4.2 How do fossils provide evidence for evolution? (2)

1.4.3 Give ONE reason why there are gaps in the fossil records. (2)

1.5 Study the table below showing the amount of medical waste produced by three provinces over a number of years.

YEAR	AMOUNT OF MEDICAL WASTE (TONNES)				
	1995	1997	1999	2001	2003
Province A	357	398	410	426	450
Province B	283	290	300	312	330
Province C	230	240	245	270	290

1.5.1 Which province has shown the most rapid increase in the amount of medical waste produced? (1)

1.5.2 What was the percentage increase of medical waste produced by the province named in QUESTION 1.5.1 over the period 1995 to 2003? Show ALL workings. (3)

1.5.3 Give TWO negative effects of dumping medical waste. (2)

1.6 The dying of trees due to acid rain is brought about by changes in the pH of the soil. Tshepo observed that trees in his town were gradually dying. He decided to investigate the effect of acid rain on germinating bean seeds. He did the following:

- Placed cotton wool on 6 saucers
- Poured a solution with a different pH (varying from pH 2 to pH 7) onto the cotton wool in each saucer
- Placed 50 bean seeds onto the cotton wool in each saucer
- Covered the seeds and left them on the shelf for a week

The following results were obtained:

pH	NUMBER OF GERMINATING SEEDS
2	0
3	4
4	10
5	15
6	28
7	35

1.6.1 Name the independent variable in this investigation. (1)

1.6.2 Name the dependent variable in this investigation. (1)

1.6.3 Name TWO ways in which the investigation could be improved to obtain accurate and valid results. (2)

1.6.4 Describe the relationship between pH and the number of germinating seeds. (2)

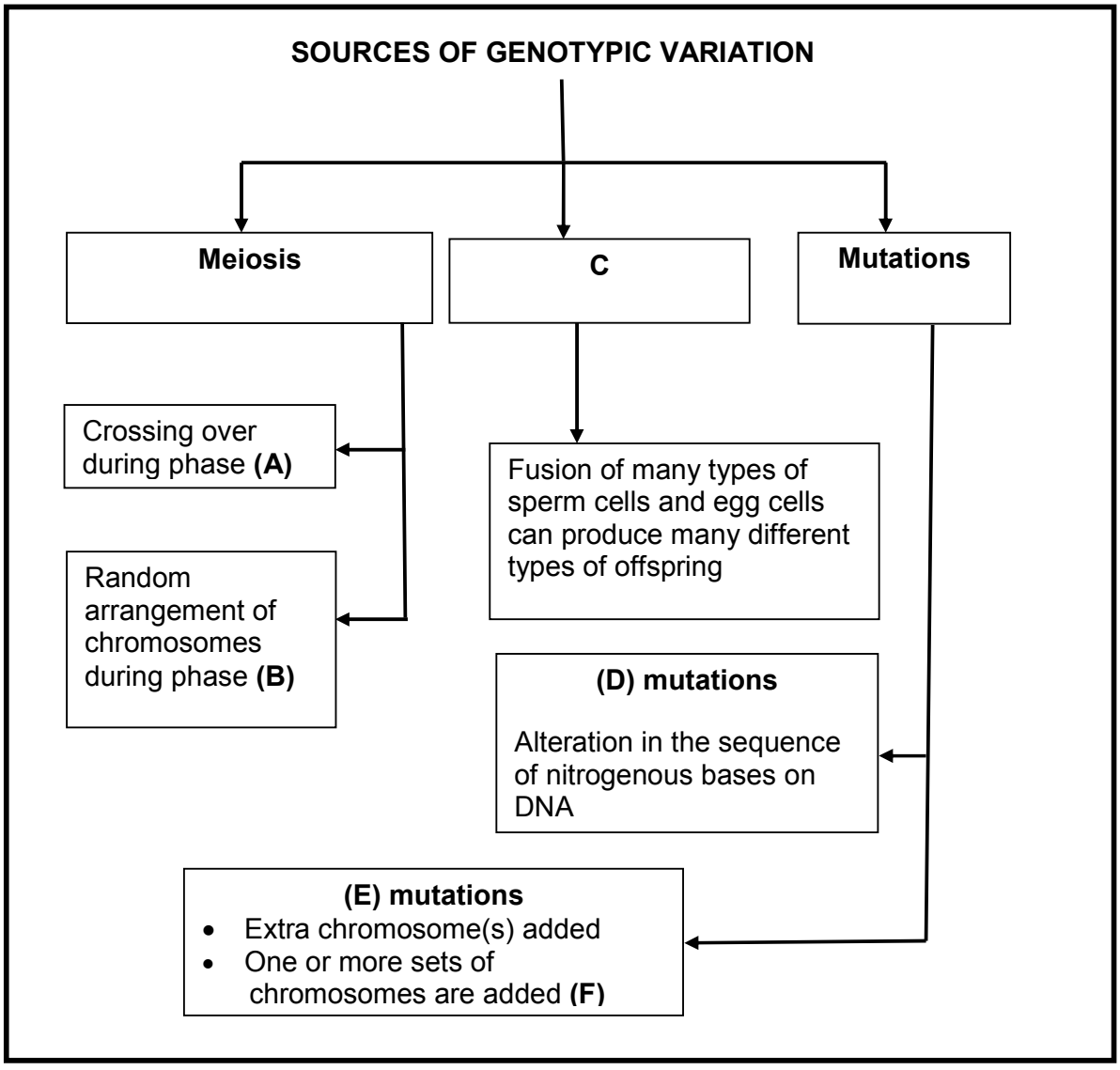
1.6.5 Suggest THREE strategies that the government can use to help reduce the formation of acid rain. (3)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The flow diagram below shows various sources of genotypic variation.



2.1.1 Name the process labelled C that is a source of genotypic variation. (1)

2.1.2 Name the phases of meiosis, labelled **A** and **B**, respectively. (2)

2.1.3 Name the TWO types of mutations, labelled **D** and **E**, respectively. (2)

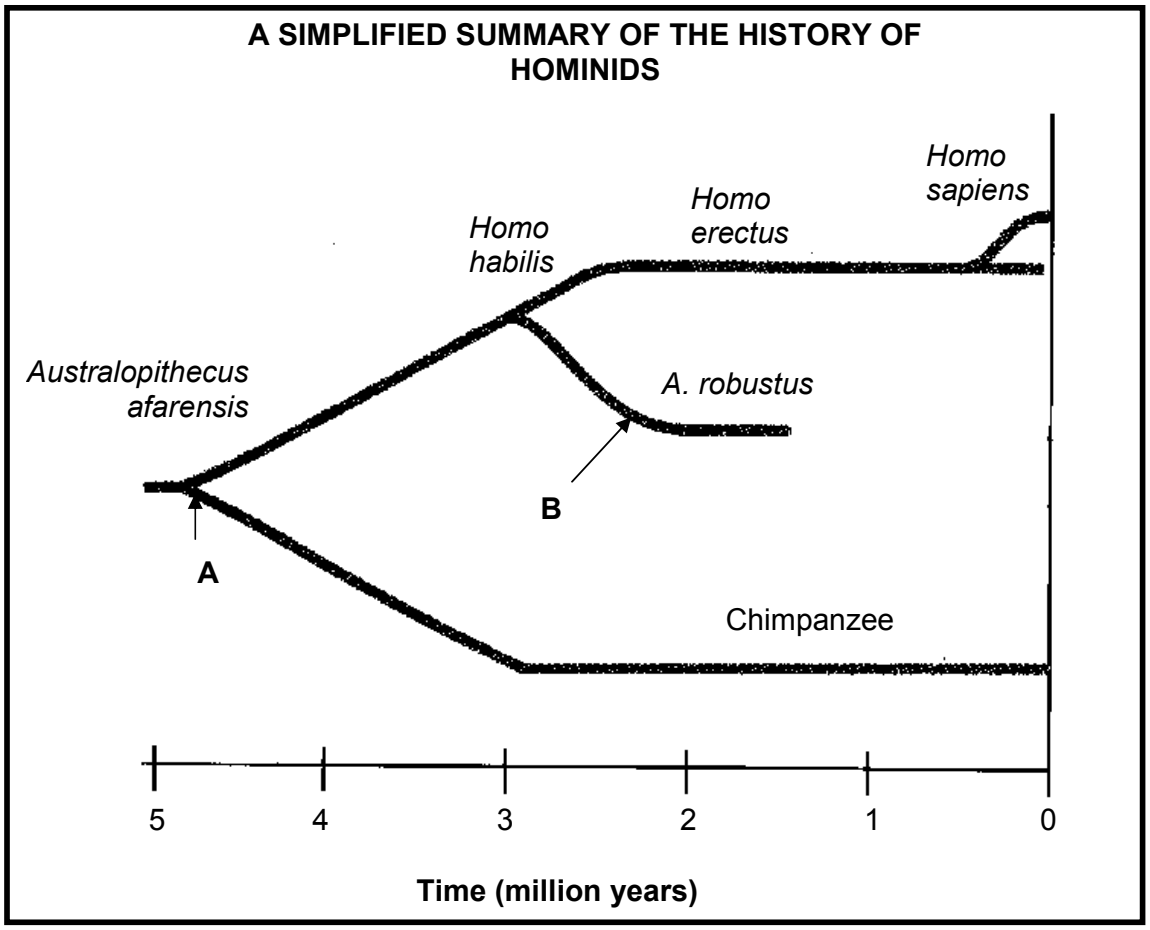
2.1.4 Describe how the process labelled **F** can lead to the formation of a new species of plants. (3)

2.1.5 State what is meant by each of the following:

(a) Lethal mutations
(b) Neutral mutations
(c) Fixed mutations (3)

2.2 Explain in terms of microevolution how tuberculosis (TB) bacterial strains develop resistance to antibiotics. (5)

2.3 During the study of the fossil records the following timeline of hominids were constructed. Study it and answer the questions that follow.



2.3.1 How many million years ago did the hominid group split (at **A**) into two groups? (1)

2.3.2 What is the main characteristic that caused the hominids to split into two separate groups at **A**? (1)

2.3.3 Which organism is thought to be the immediate ancestor of *A. robustus*? (1)

2.3.4 What are the common names of TWO *Australopithecus* species fossils that were discovered in South Africa? (2)

2.3.5 List FOUR characteristics that primates and humans have in common. (4)

2.4 Scientists accept the theory that the dinosaurs became extinct as a result of a comet or an asteroid striking the earth. Describe how this event could have led to the extinction of the dinosaurs. (5)

[30]

QUESTION 3

3.1 Since 1972, biologists Peter and Rosemary Grant from Princeton University USA have studied finch populations in the Galapagos Archipelago. The table below shows their data for one finch population on one island (Daphne Major), for a period of 7 years.

Year	1974	1975	1976	1977	1978	1979	1980
Rainfall (mm)	-	-	130	20	130	70	50
Number of finches	1 200	1 400	1 200	150	350	300	200
Small seeds (mg/m^2)	-	800	600	90	300	70	50

3.1.1 Use the information in the table to draw a line graph to show the number of finches from 1974 until 1980. (11)

3.1.2 In which year were the largest drop in rainfall, number of seeds and number of finches recorded? (1)

3.1.3 Explain how the three events mentioned in QUESTION 3.1.2 are related to each other. (3)

3.1.4 When the number of finches decreased, there were still plenty of large seeds on the island. What does this tell you about the seed-eating habits of the finches that died? (2)

3.1.5 Do you think there was a difference in the beak sizes of the dead finches and the surviving finches? Explain your answer. (3)

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

DEVIL'S CLAW

Devil's claw (*Harpagophytum procumbens*) is found most commonly on the South African Highveld and is believed to cure a variety of illnesses. It does not have an odour, but it contains substances that make it taste bitter. It is a leafy perennial with branching roots and it thrives in clay or sandy soils. It has secondary root tubers which are used for medicinal purposes. Devil's claw is a bitter, sedative and painkilling herb that reduces inflammation and stimulates the digestive system.

3.2.1 What is the habitat of devil's claw? (1)

3.2.2 Name TWO medical conditions that can be treated with devil's claw. (2)

3.2.3 Name TWO ways in which the habitat of the devil's claw plant could become lost or reduced. (2)

3.2.4 Explain how a reduction in the number of devil's claw plants can change the energy flow and energy relationships in an ecosystem. (3)

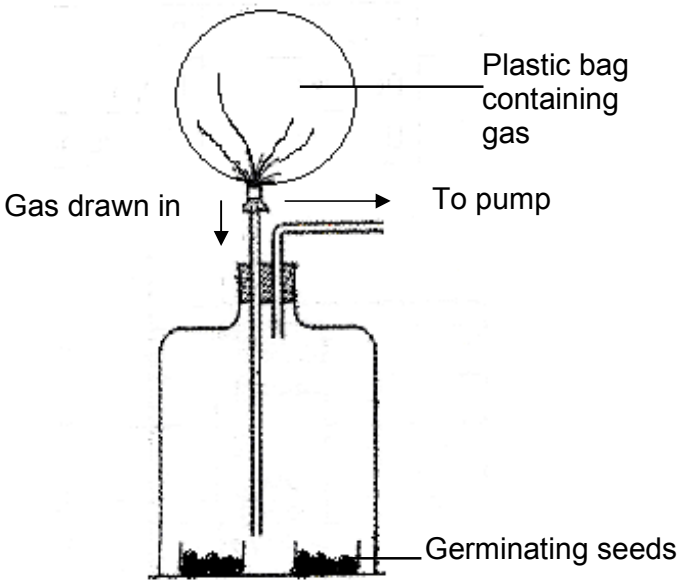
3.2.5 Name TWO ways in which the devil's claw plant can be saved from exploitation. (2)

TOTAL SECTION B: 60

SECTION C

QUESTION 4

4.1 Thandiwe does an investigation to test the effects of car exhaust fumes on germinating seeds. She set up the following apparatus:



Apparatus used to test the effect of car exhaust fumes on germinating seeds

She performed the investigation three times under each of the following air compositions:

A – Exposed to normal atmospheric air
B – Exposed to exhaust fumes

The percentage of seeds that germinated under each of these conditions over a seven-day period was recorded in the table below:

	% GERMINATION	
	A: Normal atmospheric air	**B: Exhaust fumes**
1	80	27
2	74	31
3	91	45
Average	81	34

4.1.1 Formulate a possible hypothesis for Thandiwe's investigation. (2)

4.1.2 Describe ONE way in which Thandiwe ensured reliable results in her investigation. (2)

4.1.3 Explain why the percentage of germinating seeds differs under the two air compositions. (2)

4.1.4 Explain ONE practical use of the results of this investigation. (1)

4.2 Study the table below showing fishing limits for two types of fish (1 and 2) in two different countries.

TYPES OF FISH	COUNTRY A	COUNTRY B
Fish 1	56 700	205 720
Fish 2	106 360	833 200

4.2.1 State what information is needed to set the fishing limit for each of the two countries. (2)

4.2.2 Why is the quota for fish 2 higher than that of fish 1? (2)

4.2.3 The limits for both types of fish could be different in a few years' time. Give a reason for this. (2)

4.2.4 Explain THREE management strategies by which each country could try to keep within its fishing limits. (6)

4.3 Explain how scientists have used each of the following as evidence for evolution:

4.3.1 An appendix is present in the alimentary canal of humans (3)

4.3.2 Gills slits are present at one stage in the development of the human embryo (3)

4.4 Since 2002, water polluted with heavy metals has entered a river passing through an industrialised area. The polluted water comes mostly from mining activities and is a threat to human health. The polluted water is rich in heavy metals as well as radioactive toxins that can poison the environment.

Write an essay that includes arguments against and in support of mining, the negative impact of mining on human health and strategies that could be used to prevent water pollution caused by various factors.

Content: (12)
Synthesis: (3)
(15)

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

TOTAL SECTION C: 40

GRAND TOTAL: 150