Education

KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES

FINAL EXAMINATION

15 NOVEMBER 2018

GREENBURY SECONDARY SCHOOL

GRADE 11
PAPER TWO

MARKS: 150

TIME: 2½ hour

N.B. This question paper consists of 9 pages excluding this page.

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 of each question.
6. Make ALL drawings in pencil and label them in blue or black ink.
7. Draw diagrams, tables or flow charts only when asked to do so.
8. The diagrams in this question paper are NOT necessarily drawn to scale.
9. Do NOT use graph paper.
10. You must use a non-programmable calculator, protractor and a compass, where necessary.
11. Write neatly and legibly.

Section A

Question one

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 All viruses are:

A. autotrophic
B. pathogenic
C. decomposers
D. multicellular

1.1.2 Bacteria that convert nitrogen gas into nitrates are called:

A. nitrate bacteria
B. nitrogen fixing bacteria
C. nitrifying bacteria
D. denitrifying bacteria

1.1.3 Animals which can be cut in only one vertical place through the central axis to give two mirror images are:

A. asymmetrical
B. radially symmetrical
C. bilaterally symmetrical
D. not cephalised

1.1.4 Insect pollinated flowers

A. produce large quantities of pollen.
B. are dull and inconspicuous.
C. have reduced petals
D. give off pleasant smells.

1.1.5 Antibodies are proteins that
- A. bind with any protein
- B. are produced by t- cells that kill disease causing viruses
- C. break down pathogens
- D. catalyse biochemical reactions

1.1.6 Which of the following statements about viruses is correct?
- A. Viruses can infect bacteria
- B. Each virus can infect different hosts
- C. Each virus has a wall of cellulose
- D. Viruses cannot be seen under the electron microscope

1.1.7 Which of the following is not found in pteridophytes:
- A. Sporangia
- B. Seeds
- C. Spores
- D. Sori

1.1.8 In which of the following plant groups do male gametes depend on water/ moisture to swim towards the ovum:
- A. Pteridophytes and Gymnosperms
- B. Bryophytes and Pteridophytes
- C. Bryophytes and Gymnosperms
- D. Pteridophytes and Angiosperms

1.1.9 Saprophytic fungi derive nutrients from:
- A. living organisms
- B. the atmosphere
- C. non- living organisms matter
- D. both A and B

[9X2=18]

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 1.2.8) in your answer book.

1.2.1 Symbiotic relationship between virus and human.
1.2.2 Species that are naturally occurring in an area.
1.2.3 Transfer of pollen grains from the anther to the stigma of a flower.
1.2.4 Large-scale cultivation of exotic trees for the production of timber and paper.
1.2.5 The sensible and careful use of resources so that they would be available for future generations as well.
1.2.6 A specialised gut with two openings.
1.2.7 Heart shaped structures that form part of the life cycle of ferns.
1.2.8 Organisms that have a definite nucleus.
1.2.9 The type of asexual reproduction in which bacteria split into two, as in mitosis.
1.2.10 The germ layer that gives rise to muscles and internal organs.

[10X1=10]

1.3 Indicate whether each of the statements in column 1 applies to A only, B only, Both A and B or None of the items in column 2. Write **A only, B only, Both A and B or None** next to the question number (1.3.1 to 1.3.7).

Column 1	Column 2
1.3.1 Example of a greenhouse gas.	A- Methane B- Ozone
1.3.2 Consequence of deforestation.	A- Increased biodiversity B- Increased global warming
1.3.3 A process to exploit shale gas reserves in underground rock formations.	A- Fracking B- Leaching
1.3.4 The offspring produced are genetically identical to each other	A- Vegetative reproduction B- Asexual reproduction
1.3.5 Can be saprophytic or parasitic	A- Bacteria B- Fungi
1.3.6 Factor decreasing water availability	A- Destruction of wetlands B- Exotic plants
1.3.7 Site constructed to dispose of waste	A- Reservoir B- Landfill

[7X2=14]

1.4 Study the list of characteristics below:

A. Produces seeds
B. No true roots
C. Conducting tissue present
D. No cuticle
E. Adventitious root system
F. Sori bearing sporangia with spores
G. Stem with bark

Write down only the letter/s of:

1.4.1 Two characteristics that apply to Bryophytes. (2)
1.4.2 Three characteristics that apply to Pteridopytes. (3)
1.4.3 Three characteristics that apply to Gymnosperms. (3)
[8]

Total Section A= 50

Section B

Question two

2.1 Study the table below that shows the changes in antibiotic resistance in three strains of bacteria:

YEAR	ANTIBIOTIC RESISTANCE (%)		
	MRSA	VRE	FQRP
1981	2	0	0
1985	10	0	0
1989	15	2	0
1993	40	5	5
1997	40	20	10
2001	60	20	25

[Source: http://wallace.genetics.uga.edu/groups/evol]

2.1.1 Which bacteria strain was the:

a) most resistant to antibiotics over the years? (1)
b) last to develop antibiotic resistance? (1)

2.1.2 Calculate the percentage increase in antibiotic resistance in VRE from 1993 to 1997.

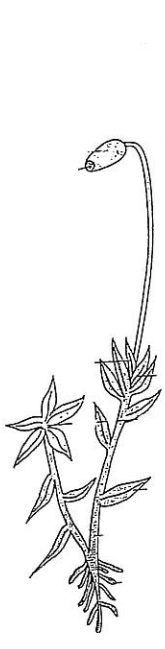
(3)

2.1.3 Draw a line graph to show the development of antibiotic resistance in the bacterial strain MRSA. (6)

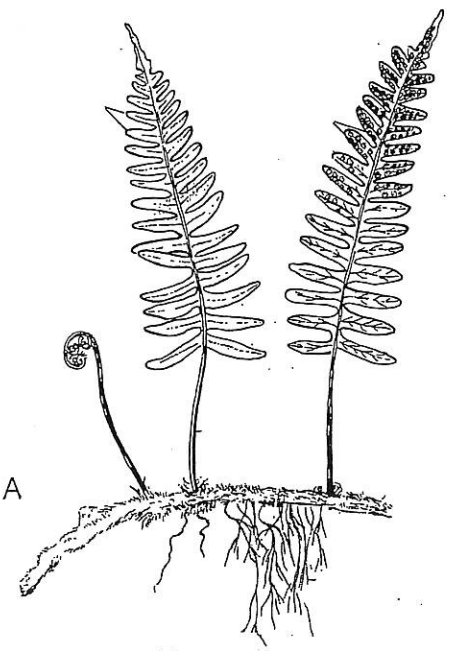
2.1.4 Explain 2 ways how antibiotic resistance can be avoided. (4)

[15]

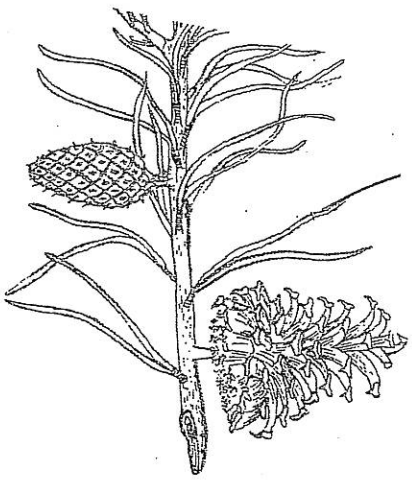
2.2 The diagrams below show four different plant groups:



A



B



C

D

2.2.1 Identify the group to which each of the following plants belong:

2.2.1.1 A (1)

2.2.1.2 B (1)

2.2.1.3 C (1)

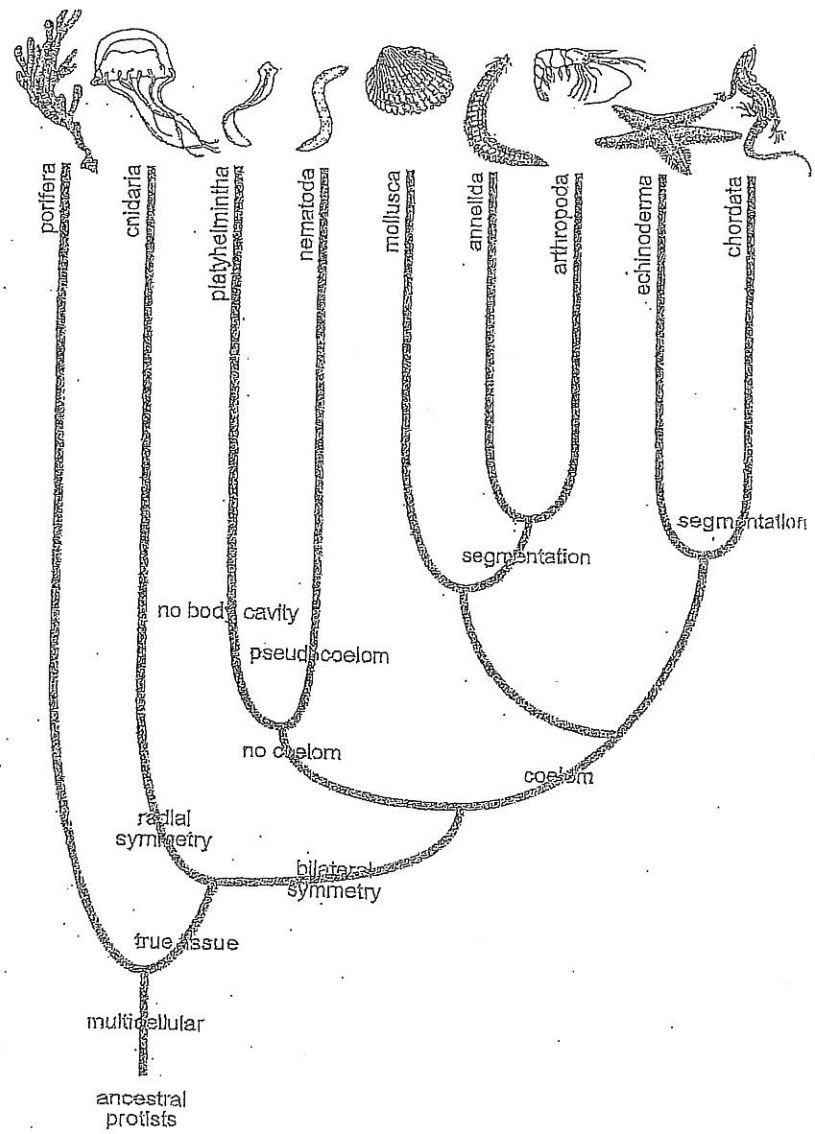
2.2.2 Which of the four groups identified in 2.2.1:

a) are spore- bearing? (1)
b) are naked seeded? (2)

2.2.3 Explain two ways how seeds are considered to be an evolutionary advancement over spores. (4)

[10]

2.3 Study the phylogenetic tree of animals and answer the questions that follow:



2.3.1 Which group of organisms was the ancestor of the animal kingdom? (1)

2.3.2 How many phyla are shown on the tree? (1)

2.3.3 Tabulate 2 differences between cnidarians and nematodes. (5)

2.3.4 List 2 characteristics of arthropods as shown in the diagram. (2)

2.3.5 The first major split in the animal kingdom was into radial and bilateral symmetry.

2.3.5.1 Which phylum does not form part of this split? (1)

2.3.5.2 Which phylum has radial symmetry? (1)

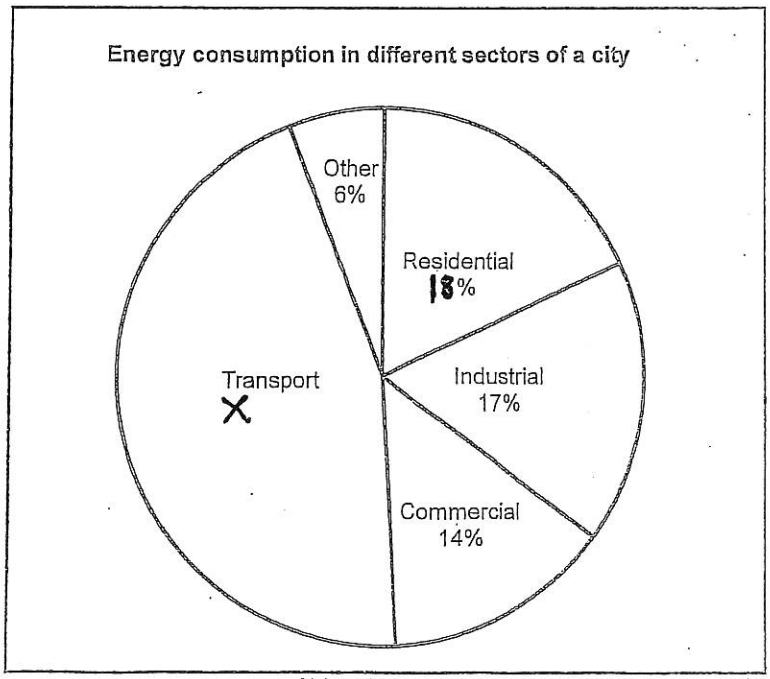
2.3.5.3 Explain how radial symmetry is appropriate to the organism of the phylum in 2.3.5.2. (4)

[15]

{40}

Question three

3.1 Energy in South Africa is mainly generated from coal-fired power stations. The pie chart below shows the energy consumption in different sectors of a South African city in 2007.



[Adapted from *Energy Scenarios for CT to – 2050*, 2011]

3.1.1 Determine the value of X. Show ALL calculations. (2)

3.1.2 Which sector consumes the least energy in this city? (1)

3.1.3 The residential energy consumption in this city increased by 3% in 2009. Give TWO possible reasons for this increase. (2)

3.1.4 Explain the impact of the increased use of energy generated from coal power stations on climate change. (4)

3.1.5 South Africa, like many other countries, has signed a declaration to reduce its CO_2 output over time.

Explain TWO barriers that the South African government could face in trying to implement the agreement to reduce CO_2 output. (4)

[13]

3.2 A farmer conducted an investigation to determine which type of fertiliser would increase the yield of her wheat crop.

- She divided her farm into three 1 hectare plots and treated them as follows:

Treatment	**Hectare A**	**Hectare B**	**Hectare C**
Type of fertiliser	None	Contains nitrogen	Contains phosphorus
Amount of fertiliser (kg)	None	10	10

- She planted the same type pf crop, namely wheat, during November each year for five years.
- She used water from a river which flows through the farm to irrigate her crop.
- She recorded the yield per plot for each year. The yield was measured by calculating the number of kilograms of wheat produced per hectare.

3.2.1 Identify the independent variable in this investigation. (1)

3.2.2 Explain why Hectare A is considered to be the control. (2)

3.2.3 State ONE way in which the farmer has increased the validity of her results. (1)

3.2.4 If this investigation was carried out for more than five years, list THREE negative effects of planting the same type of crop over many years on the same plot of land. (3)

3.2.5 Explain how the excessive use of fertilisers can affect biodiversity if it is washed into the river. (4)

[11]

3.3 Access to clean water in South Africa varies considerably depending on the source of the water. A group of pupils conducted an investigation to determine the level of satisfaction of people who obtain water from four different sources.

Water Source	Percent Satisfied (%)	Percent Dissatisfied (%)
Borehole	73	27
Farm Dam	68	32
River	54	46
Piped Water (Tap)	79	21

3.3.1 Borehole water is obtained from an aquifer. Briefly explain why the water from this source may be of a similar quality to piped water. (2)

3.3.2

a) Which water source provides water which participants were least satisfied with? (1)
b) Suggest ONE way in which people who receive water from this source could treat the water themselves to improve its quality. (1)

3.3.3 Briefly explain how each of the following influences water quality:

a) Mining (2)
b) Destruction of wetlands (2)

[8]

3.4 Read the extract below:

INVASION OF *SPODOPTERA FRUGIPERDA* (ARMY WORM) THREATENS FOOD SECURITY IN SOUTH AFRICA

A crop-destroying caterpillar species (commonly known as the army worm) endemic to North and South America is spreading rapidly in Africa, including South Africa and is raising concerns about food security.

Different opinions exist on how the army worm reached Africa. The eggs may have arrived in maize imports or high altitude winds may have helped the moths to cross the Atlantic Ocean.

Specific pesticides have been identified to help combat the army worm.

3.4.1 Define *food security*. (2)

3.4.2 Give ONE phrase in the extract which implies that the army worm is an alien species on the African continent. (1)

3.4.3 Refer to the passage and name the type of control (mechanical, biological or chemical) used currently to fight the spreading of the army worm. (1)

3.4.4 Explain two disadvantages of using the named type pf control in 3.4.3. (4)

{40} **[8]**

Question four- Essay

4. Loss of biodiversity in various parts of the world is now happening at an alarming rate. It is said that we are presently in the midst of the 6th mass extinction of species.

Discuss the various ways that humans are causing this current mass extinction and how we can stop this trend of species loss.

[17]

Synthesis – 3 marks:

[Total essay- 20 marks]

GRAND TOTAL: 150 MARKS

PHOENIX NORTH CLUSTER

NOVEMBER EXAMINATION- 2018 MARKING MEMO

SUBJECT: LIFE SCIENCES- PAPER 2 **MARKS:** 150

GRADE: 11 **TIME:** 2.5HOURS

SECTION A

QUESTION ONE

1.1.1 B ✔ ✔
1.1.2 B ✔ ✔
1.1.3 C ✔ ✔
1.1.4 D ✔ ✔
1.1.5 B ✔ ✔
1.1.6 B ✔ ✔
1.1.7 A ✔ ✔
1.1.8 B ✔ ✔
1.1.9 C ✔ ✔

[18]

1.2.1 Parasitism ✔

1.2.2 Indigenous ✔

1.2.3 Pollination ✔

1.2.4 Afforestation ✔

1.2.5 Sustainable usage/ use ✔

1.2.6 Through ✔

1.2.7 Prothallus ✔

1.2.8 Eukaryote ✔

1.2.9 Binary Fission ✔

1.2.10 Mesoderm ✔

[10]

1.3.1 A only ✔ ✔

1.3.2 B only ✔ ✔

1.3.3 A only ✔ ✔

1.3.4 Both A and B ✔ ✔

1.3.5. Both A and B ✔ ✔

1.3.6 Both A and B ✔ ✔

1.3.7 B only ✔ ✔

[14]

1.4.1 B ✔ ; D ✔

1.4.2 C ✔ ; E ✔ ; F ✔

1.4.3 A ✔ ; C ✔ ; G ✔

[8]

[50]

QUESTION TWO

2.1.1

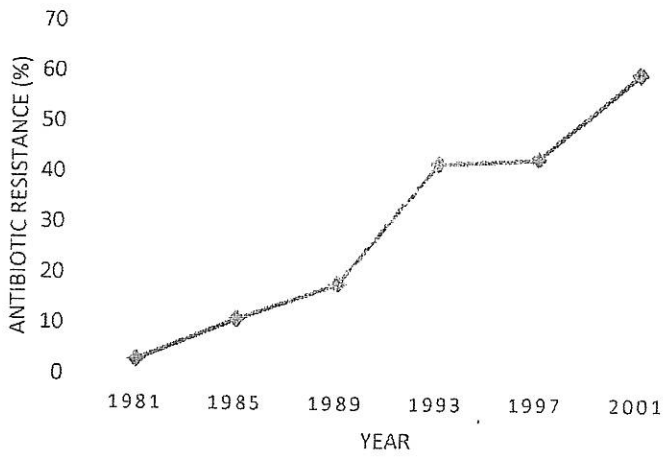
a) MRSA ✔ 1

b) FQRP ✔ 1

2.1.2 $\frac{20}{5}$ ✔ X 100% ✔ = 400% ✔ 3

2.1.3

Graph showing the development of antibiotic resistance in bacterial strain MRSA



CAPTION: 1 mark ✔

TYPE: 1 mark ✔

X- AXIS: 1 mark ✔

Y- AXIS: 1 mark ✔

PLOTTING: 2 marks ✔ ✔ 6

2.1.4

- Do not take antibiotics if not needed ✔ e.g. viral infections
- this would develop resistance by bacteria ✔
- complete fully the course of treatment ✔ to ensure that secondary infections do not recur ✔ . 4

[15]

2.2

2.2.1.1 Bryophyta ✔ 1

2.2.1.2 Pteridophyta ✔ 1

2.2.1.3 Gymnospermae ✔ 1

2.2.2

a) Bryophytes ✔ / Pteridophytes ✔ 2
b) Gymnospermae ✔ 1

2.2.3

— Contains stored nutrients ✔ and can therefore survive for a longer period ✔ in dormant state.
— Contains various attachments for dispersal ✔ and can thus colonise a wider area ✔ . 4

[10]

2.3.1 Protists ✔ / Ancestral Protists 1

2.3.2 9 ✔ 1

2.3.3 ✔

Cnidarian	Nematode
- Radial symmetry ✔	- Bilateral symmetry ✔
- No body cavity/ Pseudo coelom ✔	- Pseudo coelom present ✔

5

2.3.4

— Bilateral symmetry
— Coelom/ coelomate
— Segmented/ Segmentation

Any 2 ✔ ✔ 2

2.3.5.1 Phylum Porifera ✔ 1

2.3.5.2 Phylum Cnidaria ✔ 1

2.3.5.3

— Organisms are usually sessile/ sedentary ✔
— and wait for food to come toward them ✔
— radial symmetry allows them to capture food ✔ from all sides in environment
— can also detect danger ✔ from all sides in environment. 4

[15]

[40]

QUESTION THREE

3.1.1 X = 100- [6+18+17+14] ✔

= 100- 55

= 45% ✔ 2

3.1.2 Other ✔ 1

3.1.3

— Increase in population ✔ / households in the city which creates an increased demand.
— Increase/ decrease in weather temperatures ✔ which caused an increase in usage of heaters/ aircons. 2

3.1.4

— Higher levels of CO_2 released ✔ which causes
— Climate change speeds up ✔
— Due to enhanced greenhouse effect ✔
— Which increases global temperatures ✔
— Leading to increased droughts, floods, desertification ✔ [Any 4] 4

3.1.5

— Insufficient development of clean energy sources ✔ which forces government to rely on coal ✔
— South Africa has large reserves of coal ✔ which makes it economically viable to utilise ✔ 4

[13]

3.2.1 Type of fertiliser ✔ / Amounts of fertiliser 1

3.2.2 Not treated with fertiliser ✔ , which is the factor being investigated ✔ . 2

3.2.3

- Same area of plots (1 Hectare) ✔
- Same amount of fertiliser (10Kg) ✔ [Any 1] 1

3.2.4

- Specific nutrients would become depleted ✔
- this monoculture could cause an increase in wheat pest population ✔
- chemical pesticides may have to be used
- which could cause soil/ crop contamination ✔ 3

3.2.5

- biodiversity could decrease ✔ because
- fertiliser in water causes an increase in algal bloom ✔
- which blocks out sunlight ✔ on the surface
- causing death ✔ to lower plants in the water
- causing an increase in decomposition bacteria ✔
- which depletes aquatic ✔ fauna
- called eutrophication ✔ [Any 4] 4

[11]

3.3.1

- It is underground/ not exposed ✔
- to surface contaminants like sewage ✔ 2

3.3.2

a) River water ✔ 1
b) Boil water ✔ / add 1 teaspoon of bleach per 20litre water 1

3.3.3

a) Decreases water quality ✔
because of various acids ✔ , chemicals used
in mineral extraction processes 2

b) Decreases water quality ✔
because wetlands act ✔ as sponges which
filter sediment and purify water 2

[8]

3.4.1 Access to sufficient nutritious ✔ food to all people at all times. ✔ 2

3.4.2 "Endemic to North and South America..." ✔ 1

3.4.3 Chemical ✔ 1

3.4.4

- Chemical pesticides could kill ✔ useful animals, thus destroying biodiversity ✔ . 2
- Chemical pesticides could contaminate the wheat crop ✔ which could cause diseases ✔ in humans. 2

[8]

[40]

QUESTION FOUR

ESSAY- MEMO

Extinction of species is caused by:

- Habitat destruction ✔
- 2 forms:
  - Habitat degradation ✔ such as dranage of wetlands, ploughing ✔ for farming, soil erosion
  - Habitat transformation ✔ such as overgrazing in karoo
- Mining ✔
  - Which pollutes ✔ aquatic ecosystems
  - Trucks destroying landscape
  - Soil erosion
- Golf- estates ✔ :
  - Uses up excessive amounts ✔ of water
  - Use fertilisers which promote eutrophication ✔ death in aquatic systems
- Poaching ✔
  - Illegal killing of animals ✔
  - In unsustainable ways ✔ - populations cannot regenerate
  - Alien plant invasions ✔ - which crowd out indigenous flora and fauna
- Indigenous knowledge sytems ✔
  - Use of species ✔ for medicine and food by local people
  - If used unsustainably ✔ - leads to extinction of species

[Any 10]

Measures to reduce this biodiversity loss could include:

- Awareness programmes ✔ to conscientise people on the need to preserve biodiversity ✔
- Rehabilitation ✔ of habitats that have been degraded by farmers ✔ and mining companies
- Increase taxes ✔ on golf estates and put proceeds back into conservation ✔ programmes
- Banning the use of fertilisers ✔ near water bodies to reduce risk of deaths by eutrophication ✔

- Very severe penalties for poachers ✔ , including mandatory prison terms for convicts ✔ .
- Programmes to get communities ✔ to remove alien vegetation ✔ [hack day]
- Creation of conservancy zones ✔ [parks and reserves] to preserve endangered species ✔
- Educate people ✔ on the need for conservation

[Any 7]

Synthesis- 3

Rubric for synthesis

Relevance (1)	Logical sequence (1)	Comprehensiveness (1)
All points relevant to causes of mass extinction and ways to stop extinction.	Causes and prevention of species extinction arranged in logical sequence.	Human causes of extinction (min 8 points). Prevention of species loss (min 5 points).

Total essay- [20]

[20]

GRAND TOTAL= 150 MARKS