Bergvliet High School

LIFE SCIENCES
Final Examination
27 November 2023

GRADE 11
PAPER 2

Time: 2 ½ hours Marks: 150
Examiner: M. Wentworth
Moderators: F. Earl, G. O'Connor, S. Lambrechts and K.Stuck

NAME		**Teacher**: Ea/La/Sk/Oc/Ww

SECTION A	Q1	50	
SECTION B	Q2	50	
	Q3	50	
TOTAL		150	
PERCENTAGE			%

Instructions and Information

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions. There are **3 questions** in total and **16 pages**.
2. Write all your answers on Foolscap paper.
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. 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 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.

Write your name in the appropriate space above and circle your teacher's initials. Then detach this sheet and staple it to the front of your foolscap paper.

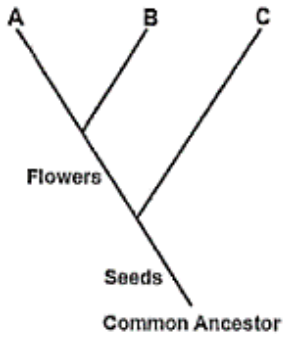
Name: _____ Teacher: _____

Section A

Question 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 1.1.10) on your foolscap paper, for example 1.1.11 D.

1.1.1 In the phylogenetic tree below…



A. A, B and C all share the resulting characteristics for seeds, A and B share the resulting characters for flowers.
B. A, B and C share the resulting characteristics of seeds and flowers.
C. Only A has the characteristics of seeds and flowers, not B and C.
D. Only B has the characteristics of flowers, and only C has the characteristic of seeds.

1.1.2 Which of the following is an adaptation of wind pollinated flowers?
A. Brightly coloured petals.
B. Large flowers.
C. Flowers give pleasant smells.
D. Large, feathery stigma.

1.1.3 Antibiotics can be used to treat:
A. Bacterial infections.
B. Viral infections.
C. Influenza.
D. Measles.

1.1.4 A saprophyte…
A. uses sunlight to manufacture its own food.
B. is dependent on dead or decaying matter for its food.
C. is parasitic.
D. is always dependent on animals for its food.

1.1.5 Which of the following produce antibodies?
A. Blood plasma
B. Lymphocytes
C. Macrophages
D. Red blood cells

1.1.6 A scientist designed an experiment to test the effect of temperature on bacterial growth. He grew three different cultures of the bacterium *E.coli* under three heat lamps at different temperatures.

What is the independent variable in this experiment?

A. Length of the experiment.
B. Number of bacteria.
C. Reproduction rate.
D. Temperature.

1.1.7 Which one of the following is NOT a characteristic of bacteria?

A. Breaks down organic matter.
B. Can be producers in food chains.
C. Are eukaryotes.
D. Form mutualistic relationships in legumes.

1.1.8 The list below describes viruses. They:

i) are the major pathogens of humans.
ii) play a significant role as decomposers.
iii) are obligate parasites.
iv) reproduce within host cells.

Which of the following are of biological importance in viruses?

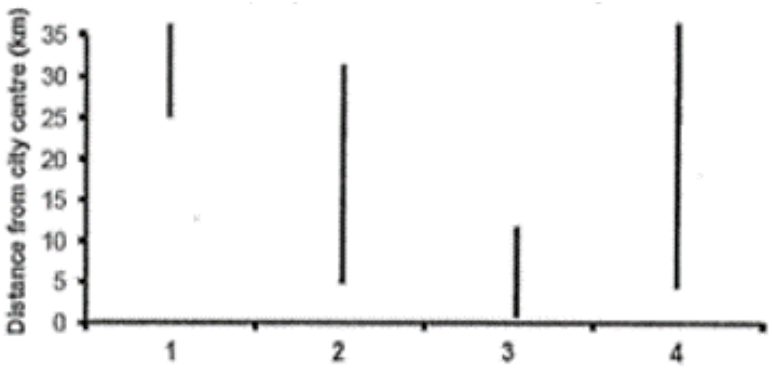
A. (i) and (ii)
B. (i), (iii) and (iv)
C. (ii) and (iii)
D. (ii) and (iv)

1.1.9 Fungi obtain their energy from:

A. Sunlight.
B. Organic matter.
C. Yeast.
D. Mycelium.

1.1.10 Air pollution is generally higher in city centres than away from it. The amount of pollution in the atmosphere can be estimated by using lichen. Lichen is a plant that consists of a fungus and an algae living together in a mutualistic relationship.

The graph below shows the growth of different lichen species at varying distances from the city centre.



Which lichen has the **HIGHEST** tolerance for varying levels of pollution.

A. Species 1
B. Species 2
C. Species 3
D. Species 4

10 x 2 = **(20)**

1.2 State the correct **biological term** for the following statements.

1.2.1 The process in which the excessive use of fertilisers cause algal bloom.
1.2.2 A large variety of plant and animal species.
1.2.3 The transfer of pollen from an anther to the stigma of the same or different flower of the same species.
1.2.4 Only one parent is involved in this type of reproduction and all the offspring have the same genetic composition as the parent.
1.2.5 The sum of all the carbon dioxide emissions resulting from an individuals activities within a given period.
1.2.6 The use of micro-organisms to make substances which are useful to humans.
1.2.7 A farming practice where a single plant species is planted on the same piece of land for a number of consecutive years.
1.2.8 Plants that occur outside of their natural habitats.
1.2.9 The type of fermentation that is used in the production of beer, wine and cheese.
1.2.10 Permeable rock from which ground water can be extracted through a borehole.

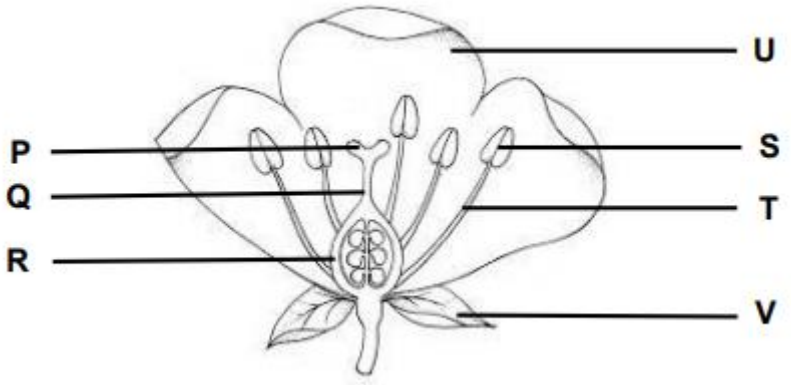
10 x 1 = **(10)**

1.3 Study the following table which consists of a statement in COLUMN I and two terms (A and B) in COLUMN II. Indicate whether each of the statements in Column I applies to A ONLY, B ONLY, BOTH A AND B or NONE. Write A only, B only, Both A and B or None next to the question number.

	COLUMN I	COLUMN II
1.3.1	Vegetation that is naturally found in an area.	A. Endemic B. Indigenous
1.3.2	Illegal hunting of animals.	A. Poaching B. Culling
1.3.3	A permanent destruction of natural vegetation.	A. Deforestation B. Desertification

3 x 2 = **(6)**

1.4 Study the diagram of the flower.



Provide the **LETTER** of the part that:

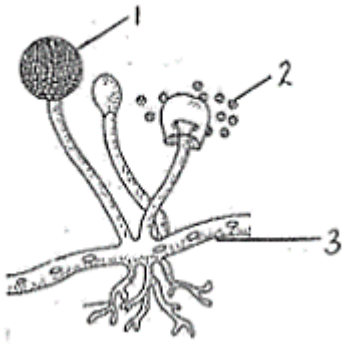
1.4.1 receives pollen grains.

1.4.2 becomes the fruit after fertilization.

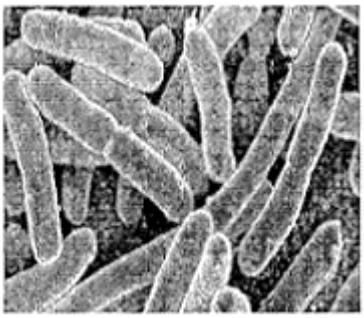
1.4.3 produces male gametes.

1.4.4 attracts pollinating agents. 4 x 1 = **(4)**

1.5 Study the diagrams of the **micro-organisms** below and answer the questions.



A. *Rhizopus stolonifer*



B. Myobacterium tuberculosis



A. Plasmodium falciparum

1.5.1 Identify the kingdom to which each of the above belong. (3)

1.5.2 Provide labels for **1**, **2** and **3**. (3)

1.5.3 State the disease caused by EACH of micro-organisms:

a) B

b) C (2)

1.5.4 Why is the micro-organism, represented by diagram **A,** classified as a saprophyte? Provide an example. (2)

(10)

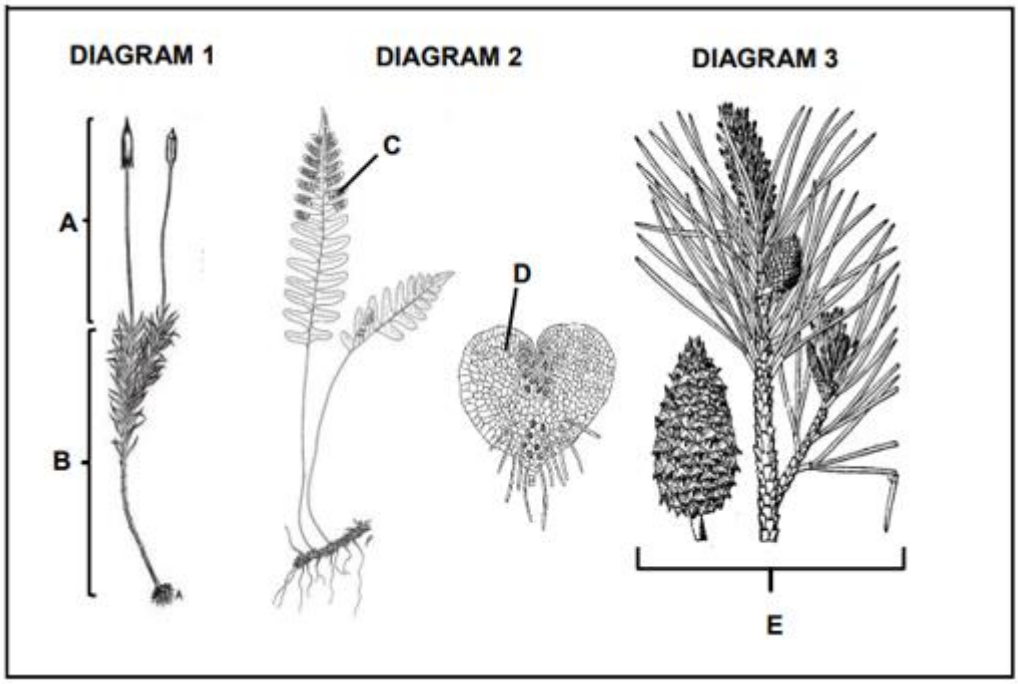
Question One = 50

TOTAL SECTION A: 50

SECTION B

Question Two

2.1 Study the diagrams below.



2.1.1 Name the Kingdom to which the above organisms belong. (1)

2.1.2 Name the Division to which the organism in DIAGRAM 1 belongs. (1)

2.1.3 Identify generations A and B in DIAGRAM 1. (2)

2.1.4 Explain the term alternation of generations. (3)

2.1.5 Give the LETTERS that represent the gametophyte generation. (2)

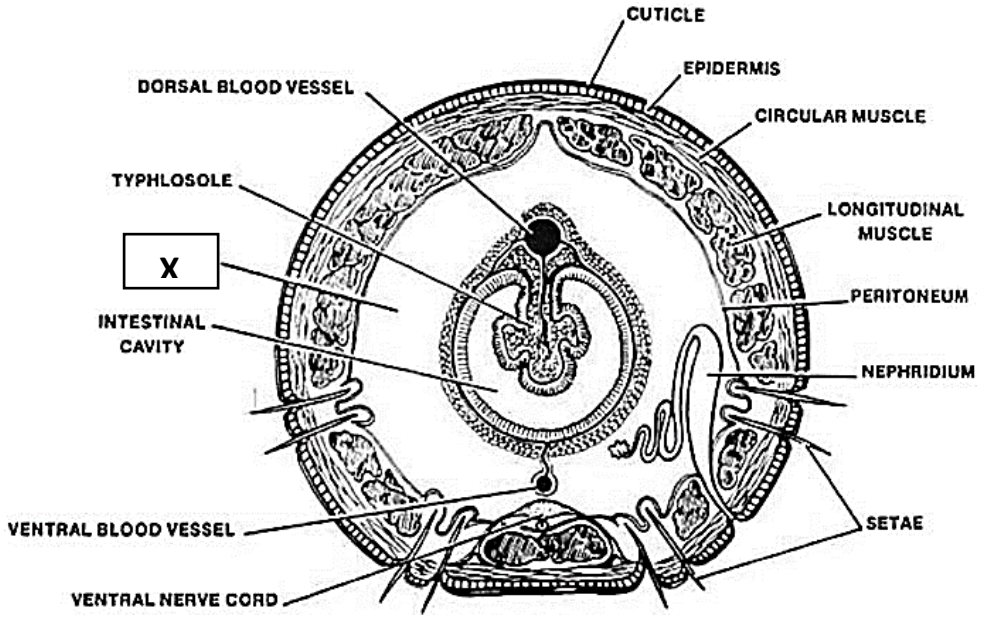
2.1.6 Give the DIAGRAM NUMBER of the group that DOES NOT rely on water for reproduction. (2)

2.1.7 Give the DIAGRAM NUMBER of the group that produces seeds. (2)

2.1.8 Explain the significance of the shape of the leaves in DIAGRAM 3. (2)

(15)

2.2 The following diagram is a **cross section through an earthworm**.



2.2.1 To which phylum do earthworms belong? (1)

2.2.2 Describe members of this phylum with regard to the following features:

a) symmetry.

b) number of tissue layers.

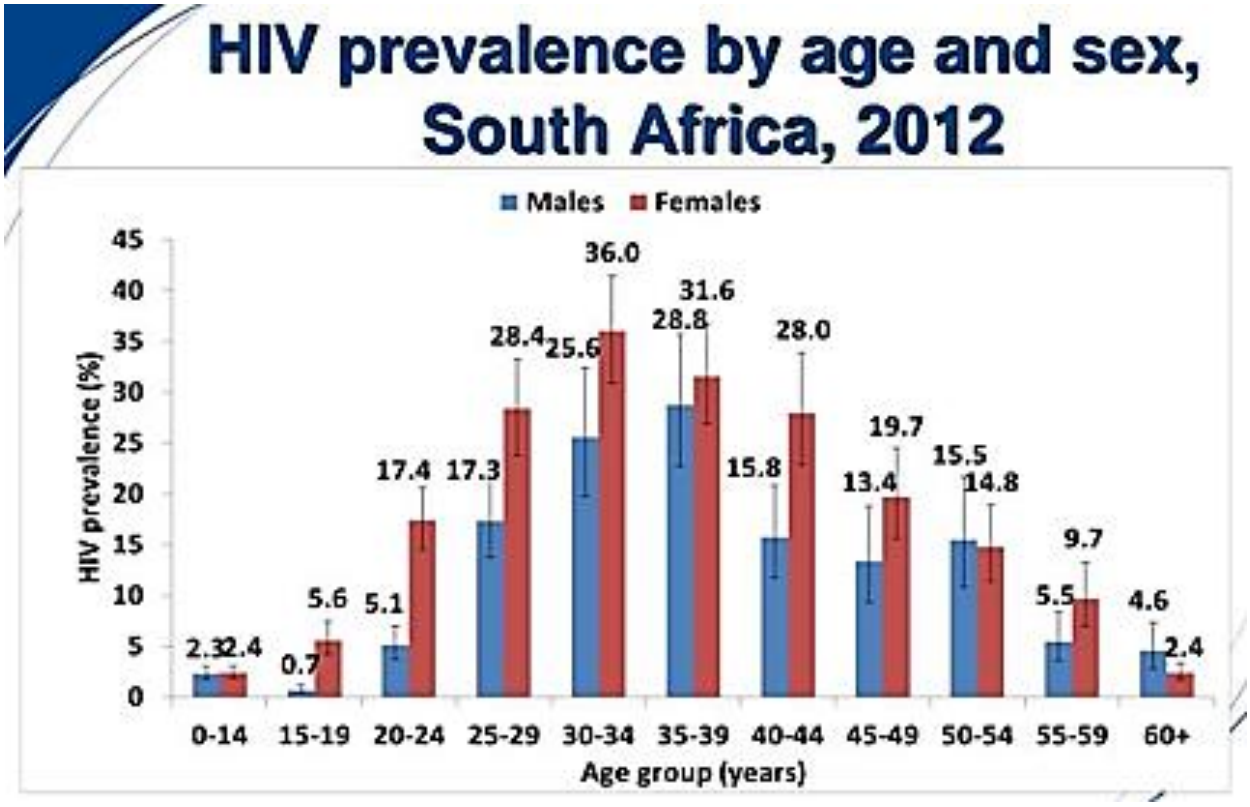
c) type of digestive system. 3 x 1 = (3)

2.2.3 The blood vessels shown in the diagram are absent in flatworms such as planaria. Account for this difference. (3)

2.2.4 Identify the area marked **X** and state two advantages of having such an area. (3)

(10)

2.3 Study the data on the **HIV prevalence in South Africa** in 2012.



Men - Left Bar ***Females - Right Bar***

2.3.1 Which age group showed the highest incidence of HIV prevalence? (1)

2.3.2 State a CONCLUSION that can be made from this graph about the prevalence of HIV. (1)

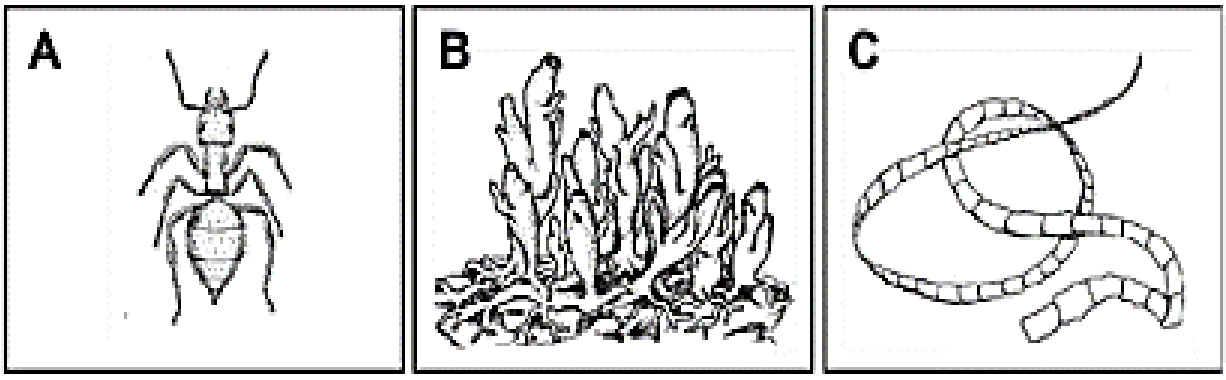
2.3.3 Provide one reason for the 2 to 3 percent HIV prevalence in children in the age group **0 to 14 years.** (1)

2.3.4 Explain how knowledge of one's HIV status can help prevent the spread of this deadly virus. (1)

2.3.5 Calculate the percentage increase in the HIV prevalence of males in the age group **20 – 24 years** and **30 – 34 years**. (3)

(7)

2.4 Figures A, B and C represent **phyla of animals**.



2.4.1 Identify the phylum represented in figures **A, B and C**. Write the letter with the correct phylum. (3)

2.4.2 What type of symmetry does Figure **A** have? (1)

2.4.3 Give one advantage of the type of symmetry mentioned in 2.4.2. (1)

2.4.4 Write down the **LETTERS** of the phyla that have the following characteristics:

a) Triploblastic
b) Dorso-ventrally flattened
c) Cephalisation
d) Coelomate (6)

2.4.5 Give one advantage of having a high surface area to volume ratio as seen in **phylum C** above. (1)

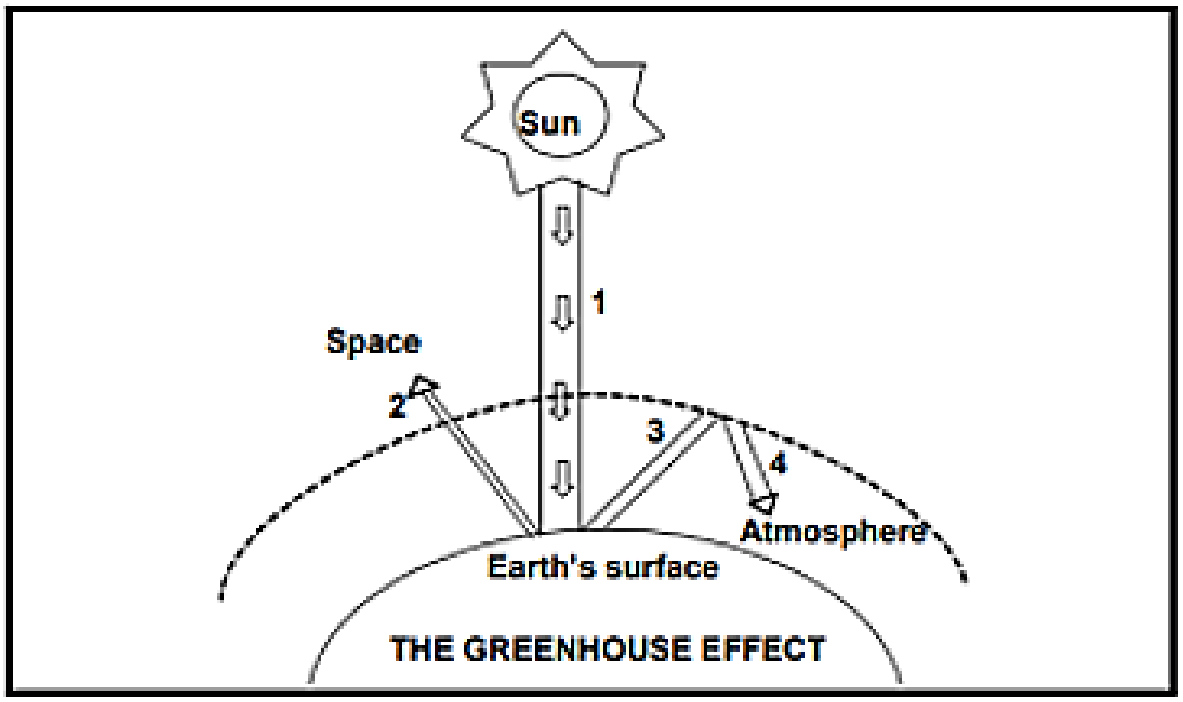
2.4.6 Draw and label a cross section of a triploblastic body plan. (6)

(18)

Question 2 = 50

Question Three

3.1 The diagram given below illustrates the **Greenhouse effect**.



3.1.1 Explain how the Greenhouse Effect occurs by using **Numbers 1 – 4** on the diagram. (4)

3.1.2 What is the advantage of the natural greenhouse effect for life on earth? (1)

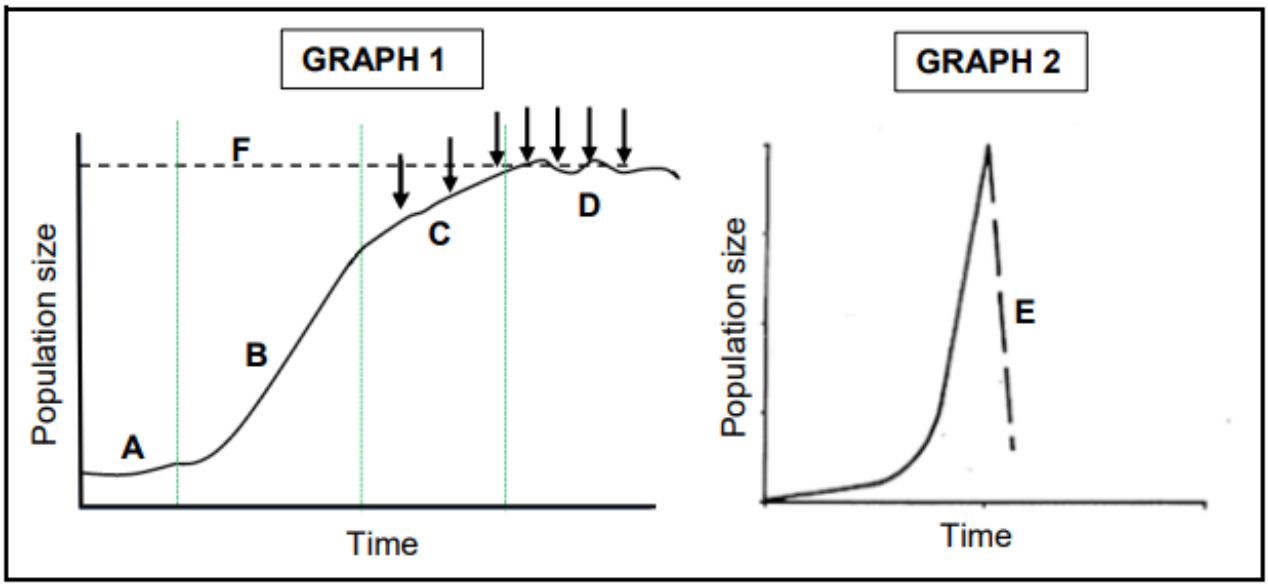
3.1.3 Which human activity makes the greatest contribution to carbon dioxide emissions? (1)

3.1.4 A big increase in the greenhouse effect can lead to the enhanced greenhouse effect which causes global warming.

Explain how global warming leads to desertification. (4)

(10)

3.2 Study the **two population growth curves** below.



3.2.1 Provide labels for phases:

(a) B (1)

(b) C (1)

(c) E (1)

3.2.2 Name the type of growth form represented by **Graph 1**. (1)

3.2.3 Which growth curve would represent the growth of a bacterial colony? (1)

3.2.4 Give the letter of the phase where:

(a) Birth rate equals death rate (1)

(b) Natality exceeds mortality by far (1)

3.2.5 What do the arrows in **Graph 1** represent? (1)

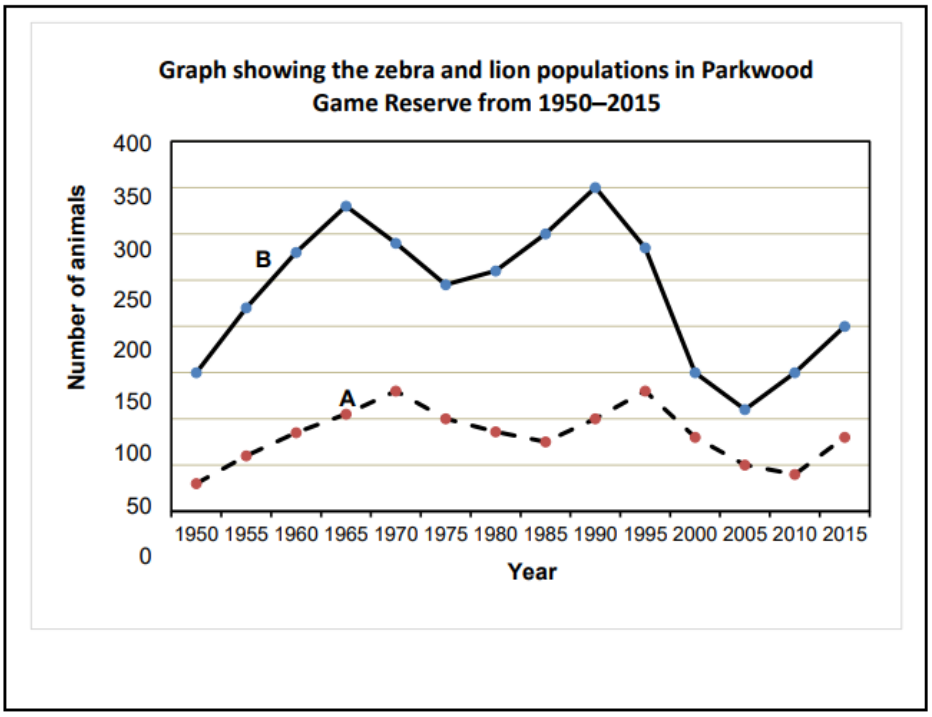
3.2.6 Give TWO reasons why the initial phase **A** starts slowly. (2)

(10)

3.3 Read the extract below and study the graph showing the zebra and lion population in Parkwood Game Reserve over a period of 65 years.

The most important reason that lions are able to find enough food is that they usually do their hunting cooperatively. Normally, several lions circle around the herd they are attacking, slowly driving their victims towards the lionesses hiding in the tall grass. These lionesses then attack their prey from the sides or the rear. Lions are not fast predators. By working in groups they are able to tackle prey that would otherwise prove to be too fast for them. Lions also gain another advantage through group hunting when they kill an animal too large for one lion to tackle on its own. Zebras are one of the major prey of lions.

The graph below shows the number of zebras and lions in Parkwood Game Reserve over a period of 65 years.



3.3.1 Give TWO reasons mentioned in the extract why the social structure of lion prides makes them successful hunters. (2)

3.3.2 What type of relationship is shown between lions and zebras in the graph above? (1)

3.3.3 Which line (A or B) represents the lion population? (1)

3.3.4 Give TWO reasons for your answer to QUESTION 3.3.3. (2)

3.3.5 In 1995 there was a large decrease in the number of zebras in the reserve. Give ONE environmental factor that could have caused this decrease. (1)

3.3.6 Zebra live in herds. Explain ONE reason why living in herds is an advantage. (1)

3.3.7 Explain why the chances of the zebra and lion population reaching carrying capacity is limited. (2)
(10)

3.4 The table below shows the **global carbon dioxide emissions** from fossil fuel combustion and some industrial processes in 2008.

COUNTRY	CARBON DIOXIDE EMISSIONS (%)
China	23
European Union	13
USA	19
India and Russian Federation	12
Other	33

[Adapted from www.environmentalprotectionagency.gov/climatechange]

3.4.1 Draw a bar graph to represent the data in the table. (6)

3.4.2 Explain the impact of the increased carbon dioxide emissions on the environment. (2)

3.4.3 Each country has been given a mandate to reduce its carbon dioxide emissions to reach a certain target. This is reviewed annually by the Conference of the Parties (COP), a United Nations organisation comprising 195 countries that meet to assess progress in dealing with climate change.

Explain TWO reasons why some countries are against reducing the carbon dioxide emissions by the industries. (2)

(10)

3.5

*Garlic is known to have the ability to fight bacteria and viruses. It is known to be effective against a wide range of bacteria and has the ability to combat the common cold. The antimicrobial substance in garlic is called **allicin**. To maintain the antibacterial properties of garlic, it must be consumed or applied as raw garlic because cooking will destroy the **allicin**.*

Scientists wanted **to investigate the effectiveness of garlic in killing bacteria**.

They conducted the investigation as follows:

- They used three petri dishes prepared with blood agar (an enriched, nutritional medium used for the cultivation of bacteria) and stored these in a refrigerator.
- Before the start of the investigation, they removed the petri dishes from the refrigerator to allow them to reach room temperature.
- They prepared three test specimens and labelled them as described below:
    - The three test tubes were labelled **A**, **B** and **C**.
    - The contents of the test tubes were measured and mixed as shown in the table on the next page:

Test tube	Contents of the Test Tube		
	100ml milk	5ml E.coli bacterium	Garlic extract
A	✓	X	X
B	✓	✓	X
C	✓	✓	✓

- The petri dishes were labelled A, B and C.
- They removed the lid in petri dish A and used the syringe to extract 10ml of the sample from test tube A and placed it in the centre of petri dish A.
- In the same way, using a new syringe, a 10ml sample was extracted from test tube B and placed in petri dish B and the procedure was repeated for petri dish C.
- The petri dish lids were replaced and the petri dishes were stored in a cool and shaded place.
- The diameter of the E.coli colony was measured every day for 5 days and recorded in the table below.

Petri Dish	**Diameter of bacteria colony (mm)**				
	Day 1	Day 2	Day 3	Day 4	Day 5
A	0	1.7	3.0	4.6	7.1
B	0	4.2	8.4	15.1	36.5
C	0	0	0	0	0

3.5.1 State:

a) The independent variable. (1)

b) The dependent variable. (1)

c) Two variables that were controlled to improve **validity**. (2)

d) Two ways in which the scientists could have improved the **reliability** of their investigation. (2)

3.5.2 Explain why the petri dishes were kept in the fridge before the start of the investigation. (2)

3.5.3 Describe and explain the results obtained in Petri Dish C. (2)
(10)

Question 3 = 50

TOTAL SECTION B: 100

GRAND TOTAL = 150