Hillcrest High School

Grade 12

Life Science

Trials Paper 2

September 2013 | **Examiner: Mrs Harmse**

Time: 2 ½ hours | **150 Marks**

Instructions

1. Write your Life Science teachers name on all booklets.
2. Answer ALL the questions.
3. Number the answers exactly as the questions are numbered.
4. Write neatly and legibly
5. Do all drawings in pencil and label them in ink.
6. Only draw diagrams and flow charts when requested to do so.
7. The diagrams in the question paper may not necessarily be drawn to scale.
8. Non-programmable calculators, protractors and compasses may be used.

SECTION A

QUESTION 1

1.1 Various possible options are provided as answers to the following questions. Choose the correct answer and write only the letter (A - D) next to the question number (1.1.1 – 1.1.6) in the answer book, for e.g. 1.1.7 D.

1.1.1 The roots of most plants grow downwards towards gravity. This growth movement is called...

A. Hydrotropism
B. Geotropism
C. Phototropism
D. Apical dominance

1.1.2 Images of objects less than six meters away from the eye are focused clearly on the retina when the ...

A. pupil dilates.
B. ciliary muscles contract.
C. suspensory ligaments become taut.
D. curvature of the lens is normal.

1.1.3 Complete metamorphosis ...

(i) Gives the individuals a greater chance of surviving to reproductive maturity.
(ii) Means all the stages in the life cycle eat the same food.
(iii) Involves specialization at each stage.
(iv) Avoids the vulnerable pupa stage.

Which of the above alternatives are correct?

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

1.1.4 Bird pollinated flowers often have ...

(i) brightly coloured petals.
(ii) a sweet scent.
(iii) large amounts of nectar.
(iv) anthers that hang outside the flower.
(v) trumpet shaped flowers.

A. i; iii; iv
B. ii; iv; v
C. i; iii; v
D. i; ii; iii

1.1.5 The reliability of an investigation can be improved by ...

(i) controlling as many variables as possible.
(ii) repeating the investigation a number of times.
(iii) drawing graphs.
(iv) using a large sample group.
(v) recording data accurately.

A. i, ii, iv and v
B. ii, iii, iv and v
C. i, ii, iii and iv
D. i, iii, iv and v

1.1.6 Plants needed by traditional healers for medicines are becoming very scarce because ...

A. the plants are being attacked by pathogens.
B. floods are damaging the plants.
C. the plants are being over-harvested.
D. chemists are selling them as medicines.

6 x 2 (12)

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 – 1.2.8).

1.2.1 The small gap where an impulse is transmitted from one neuron to another by chemical means.

1.2.2 Changes in the convexity of the lens that ensure that the light from objects is focused on the retina.

1.2.3 The muscular structure in the eye that regulates the amount of light that enters the eye.

1.2.4 A nutritional relationship where an animal captures and kills another animal for food.

1.2.5 The dominant generation in the life-cycle of flowering plants

1.2.6 The principle that states that when two organisms use the same resources at the same time, one will flourish at the expense of the other.

1.2.7 The process by which the embryo attaches to the wall of the uterus.

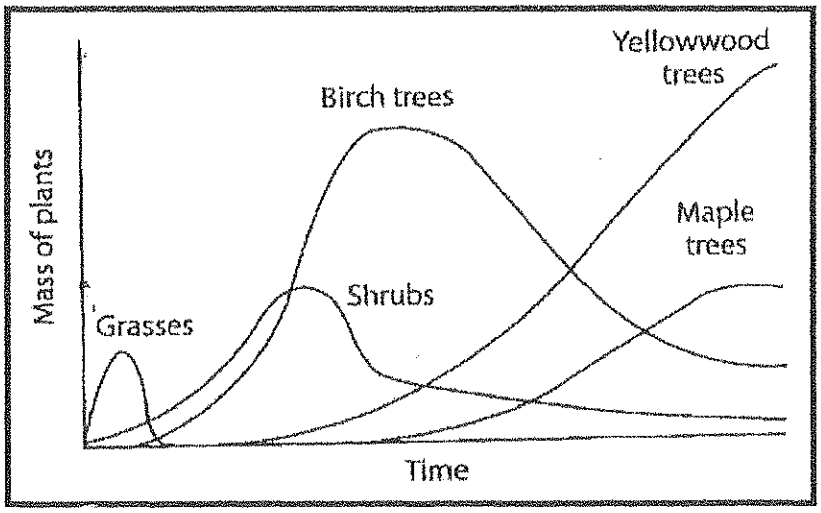
1.2.8 The formation of sex cells by meiosis. **(8)**

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 1.3.6) in the ANSWER BOOK.

STATEMENTS	ITEMS
1.3.1 Factors that cause populations to increase in size.	A: Emigration B: Natality
1.3.2 Temporarily stores sperm.	A: Scrotum B: Epididymis
1.3.3 Competition between different species.	A: Intraspecific B: Parasitism
1.3.4 The clouding of the lens of the eye.	A: Cataract B: Astigmatism
1.3.5 A group of organisms with similar characteristics living in the same habitat that are able to interbreed to produce fertile offspring.	A: Species B: Population
1.3.6 A symbiotic relationship where both organisms benefit.	A: Mutualism B: Commensalism

6 x 2 (12)

1.4 The graph below represents the plant life growing on an initially bare piece of ground over a period of time. Study the graph then answer the questions that follow.



1.4.1 Name the process that is represented by the graph? (1)

1.4.2 Define the process named in question 1.4.1. (2)

1.4.3 Name **ONE** plant that established itself as a pioneer in this area. (1)

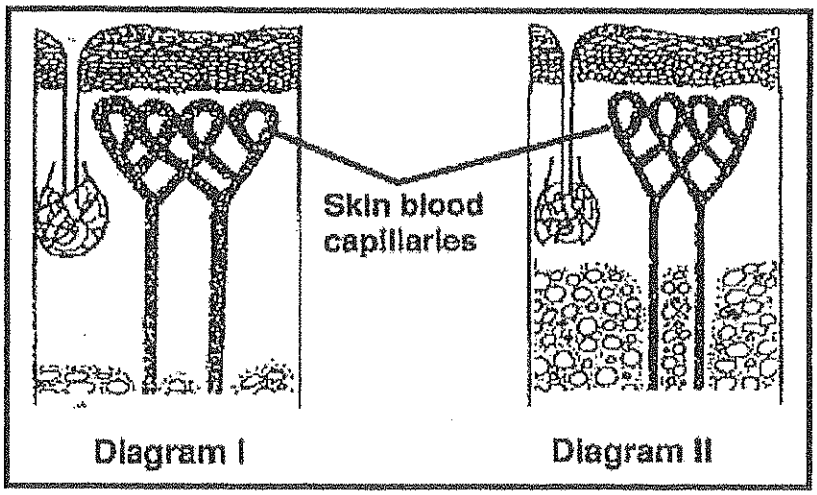
1.4.4 Name **ONE** type of tree that forms part of the final, stable community of this ecosystem? (1)

1.4.5 What term is used to describe this final, stable community mentioned in question 1.4.4? (1)

1.4.6 Which plant type, in this community, became extinct? (1)

1.4.7 Explain **ONE** reason why it is important for humans that ecosystems are conserved in their final, stable state. (2)
(9)

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



1.5.1 a) Which diagram (I or II) can be associated with a high concentration of adrenalin in the blood? (1)

b) Explain your answer to question 1.5.2. (3)

1.5.2 a) Which diagram (I or II) represents hot environmental conditions? (1)

b) Give an explanation for your answer in question 1.5.2 (a) using **ONE** visible reason from the diagram. (2)

c) Name **TWO** changes that will occur in the body to help a person cope with very cold environmental conditions. (2)
(9)

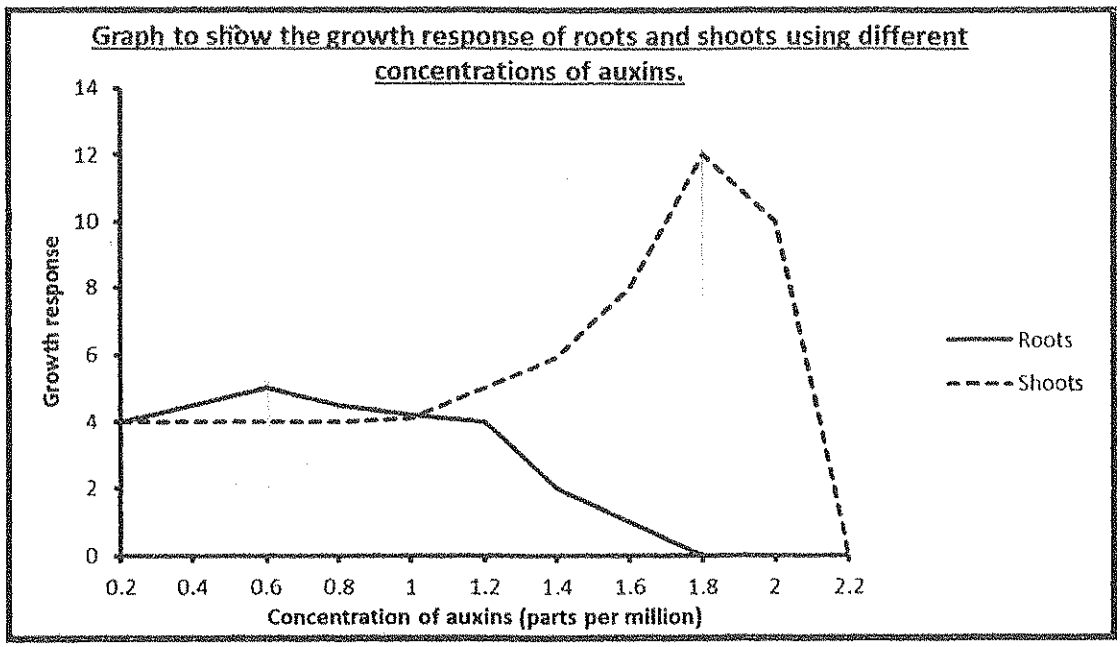
TOTAL QUESTION 1: 50

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The graph below shows the growth response of roots and shoots to auxins applied at different concentrations. Study the graph then answer the questions that follow.



2.1.1 Give the concentration of auxins that is best for shoot development. (2)

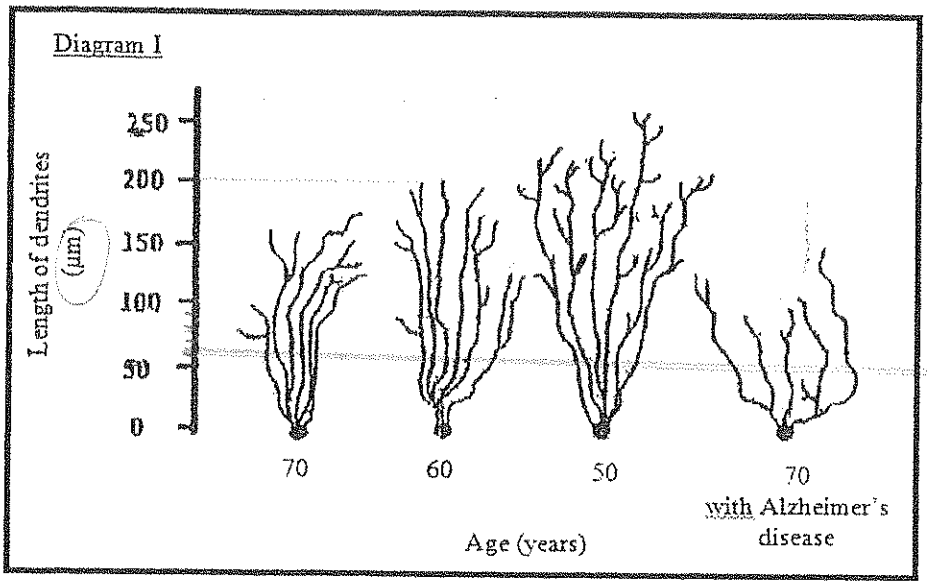
2.1.2 A farmer wants his plants to develop large, healthy root systems. What concentration of auxins should he use when spraying his crops? (2)

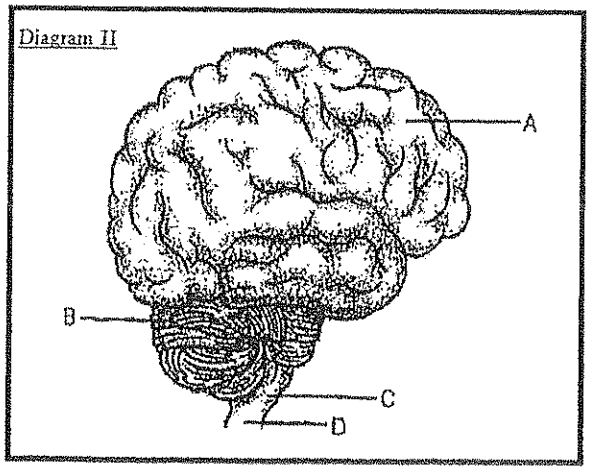
2.1.3 a) Which plant organ, the roots or shoots, are more sensitive to auxins? (1)

b) Give an explanation for your answer in question 2.1.3 (a). (1)
(6)

2.2 Study the diagrams provided below and answer the questions that follow.

Diagram I shows the appearance and the length of the dendrites of neurons in a part of the human brain. The neurons are from healthy adults aged 50; 60 and 70 years and from a 70 year old person with Alzheimer's disease.
Diagram II is of the human brain.





2.2.1 State the maximum length of the dendrites of a 60 year old adult. (2)

2.2.2 Describe **TWO** changes in length and appearance of the dendrites of healthy adults as they get older? (2)

2.2.3 Which part of the brain, A, B, C or D, is affected by Alzheimers? (A) (1)

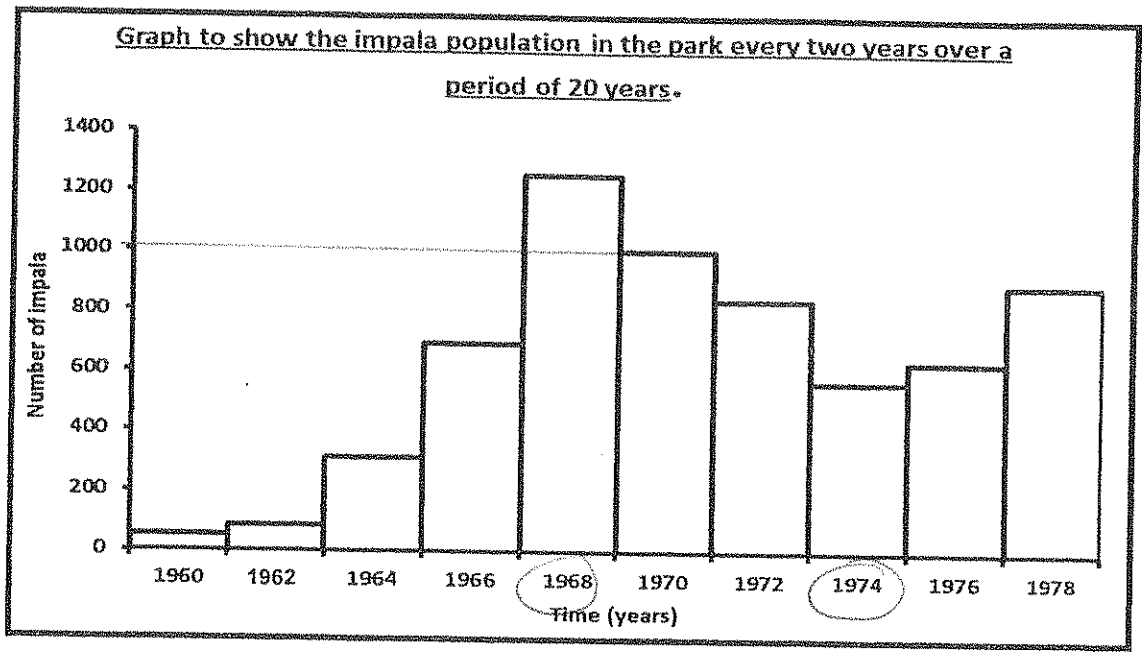
2.2.4 Give a reason for your answer to question 2.2.3. - A - for reasoning, judgement, memory (1)

2.2.5 Draw a labeled diagram of the type of neuron that would carry a nerve impulse from the receptor to the part labeled D. (4)
(10)

receptor — CNS

sensory

2.3 An investigation was carried out to investigate the growth of an impala population in a park. An area of grass and shrub land was fenced off and 50 impala buck (25 male and 25 female) were introduced. The park contained no other buck or predators. The number of buck present in the park was counted every two years, in July. The graph below shows the impala population each July over a 20 year period.



2.3.1 Give **TWO** reasons why the growth rate from 1960 to 1962 is slow. (2)

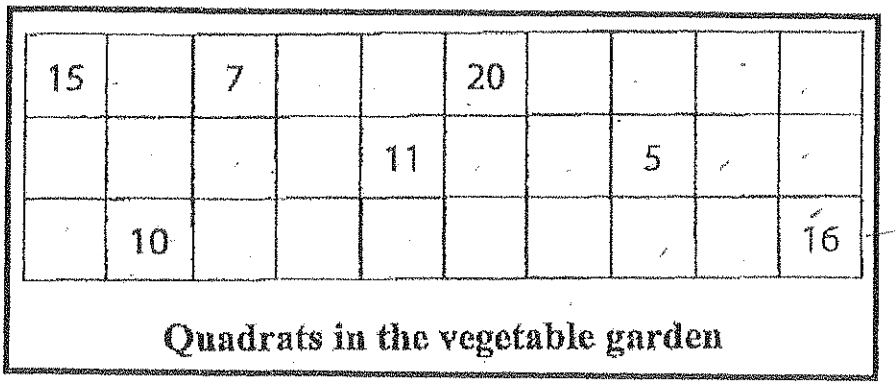
2.3.2 Name **TWO** density dependent factors that may have contributed to the decrease in the population from 1968 to 1974. (2)

2.3.3 How many impala were there in the park in 1970? (1)

2.3.4 a) During which year were predators released into the park? (1)

b) Give an explanation for your answer in question 2.3.4 (a). (2)
(8)

2.4 A gardener wanted to know the number of weeds in his vegetable garden which is 10m wide and 3m long. He took a number of quadrat samples which were1m^2. The numbers in the quadrats represent the number of weeds occurring there.



Quadrats in the vegetable garden

2.4.1 a) Were the samples taken at random? (1)

b) Give a reason for your answer in question 2.4.2 (a). (1)

2.4.2 Calculate the following …

a) the average number of weeds in the samples. (2)

b) the size of the weed population in the whole vegetable garden, by using the formula:

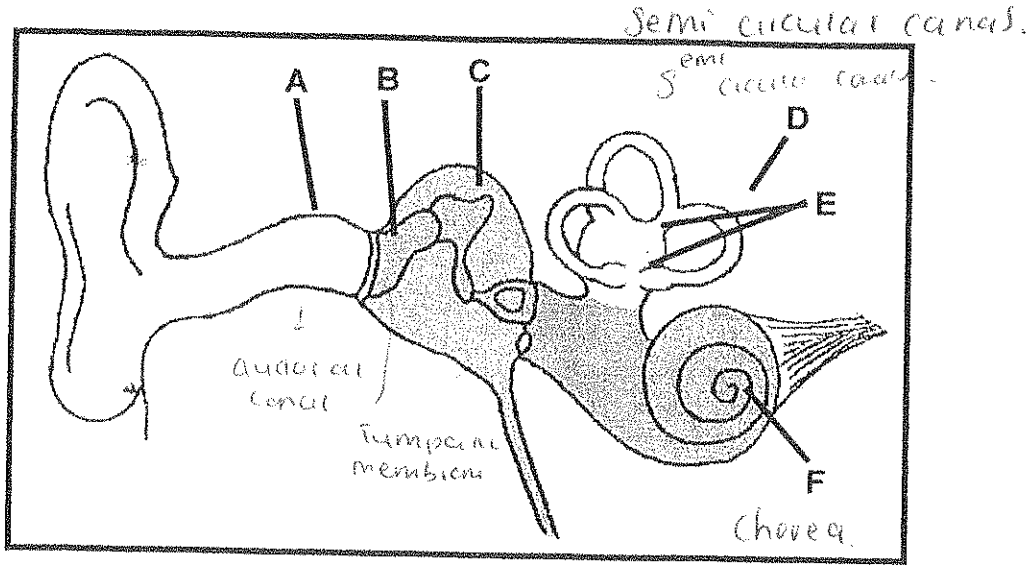
$$\text{Average number in sample} \times \frac{\text{habitat size}}{\text{sample size}}$$ (2)

(6)

TOTAL QUESTION 2: 30

QUESTION 3

3.1 Study the diagram of the ear and answer the questions that follow.



3.1.1 Part A secretes a wax known as cerumen. Sometimes the wax forms a plug against part B.

a) State **ONE** function of cerumen. (1)

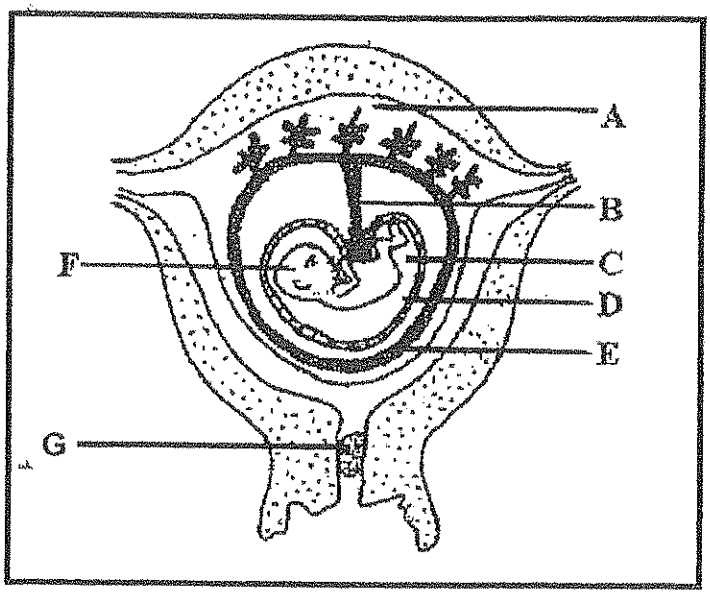
b) Explain the effect on hearing if a waxy plug is formed against part B. (2)

3.1.2 a) Will sound waves reach part F if part C was removed? (1)

b) Give a reason for your answer in question 3.1.2 (a). (2)

3.1.3 Explain the role that the parts labeled D and E play in the balance and equilibrium in the body. (4)
(10)

3.2 Study the diagram provided below of a developing embryo in the uterus. Use the diagram to answer the questions that follow.



3.2.1 Identify the parts labeled A, B and D. (3)

3.2.2 The structure labeled B contains an artery and a vein. Tabulate **TWO** differences in the composition of the blood in these two blood vessels. (5)

3.2.3 Structure G is a mucous plug that forms in the cervix during pregnancy. Suggest ONE reason why this plug forms. (2)
(10)

3.3 Read the extract provided below then answer the questions that follow.

> Diabetes, when there is too much glucose in the blood, is becoming a crisis. **The crisis**. It's big, it's scary, it's growing and it's very, very expensive. It's clearly an epidemic, and it could bring the health service to its knees. The condition is now nearly four times as common as all forms of cancer combined, and causes more deaths than breast and prostate cancer combined.
>
> The biggest preventable risk factor in the development of diabetes is weight. It is an obesity driven epidemic. This is about unhealthy diet, and lack of exercise. It is just so easy to eat nowadays. We live in a 'glucotoxic' environment and we simply don't get the physical exercise we used to.
>
> **Adapted from: Diabetes: The Epidemic by Jon Henley; Mail & Gaurdian 10/10/2011**

3.3.1 a) Name the hormone that is responsible for reducing a person's blood glucose levels. (1)

b) Name the organ that produces the hormone named in question 3.3.1. (1)

c) Explain **TWO** ways in which this hormone brings about a decrease in the blood glucose levels. (4)

3.3.2 Give **TWO** reasons why diabetes is considered to be very expensive. (2)

3.3.3 Give **TWO** lifestyle changes that a person could make to reduce their risk of developing diabetes. (2)
(10)

TOTAL QUESTION 3: 30

TOTAL SECTION B: 60

SECTION C

QUESTION 4

4.1 The table below gives the ecological footprint of various regions of the world as well as the biocapacity of each of the regions. A region's biocapacity is the ability of the ecosystems in the region to produce useful biological materials and to absorb waste materials.

Study the table then answer the questions that follow.

Region	Ecological Footprint (%)	Global biocapacity (%)
North America	22	17
Latin America and Caribbean	8	26
Africa	7	10
Asia Pacific	34	24
European Union (EU)	16	9
Europe (non-EU)	7	11
Middle East and central Asia	6	9

4.1.1 Explain the term 'ecological footprint'. (2)

4.1.2 Draw a pie chart to represent the ecological footprint of the various regions. (10)

4.1.3 a) Calculate by how much the ecological footprint of the Asia Pacific region is greater than its biocapacity. (2)

b) Explain the possible consequences in the future of the ecological footprint exceeding the biocapacity. (2)

4.1.4 Although North America and Asia Pacific both make great demands on the world's resources, North America has about 5% of the world's population while Asia Pacific contains about 56% of the world population.

Explain what this shows about the distribution and use of the world's resources. (3)

4.1.5 Which region, North America or Asia Pacific, is a developed country? (1)
(20)

ovary's
Oestrogen , B progesteron

4.2 Chemical co-ordination within the body is essential for the reproductive process in males and females.

Write an essay in which you explain the hormonal control of the menstrual cycle of a human being when no fertilization occurs.

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

inhibit stimulate ovary.

Content: (17)
Synthesis: (3)

(20)

TOTAL QUESTION 5: 40

TOTAL SECTION C: 40

GRAND TOTAL: 150