GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

GAUTENG DEPARTMENT OF EDUCATION

PREPARATORY EXAMINATION

2015

10831

LIFE SCIENCES

FIRST PAPER

MARKS: 150
TIME: 2½ hours

Pages 18

LIFE SCIENCES: Paper 1
1083E
10831E

X05

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(First Paper)

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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in your 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 necessarily drawn to scale.
9. Do NOT use graph paper.
10. You may use a non-programmable calculator, protractor and compass where necessary.
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 (1.1.1–1.1.8) in your ANSWER BOOK, for example 1.1.9 D.

1.1.1 Which of the following is CORRECT regarding meiosis?

A A haploid cell gives rise to two haploid cells
B A diploid cell gives rise to two haploid cells
C A haploid cell gives rise to four haploid cells
D A diploid cell gives rise to four haploid cells

1.1.2 A carbon footprint can be defined as the amount of carbon...

A released by plants in a year.
B used for human activities in a year.
C produced by human activities in a year.
D used by plants in a year.

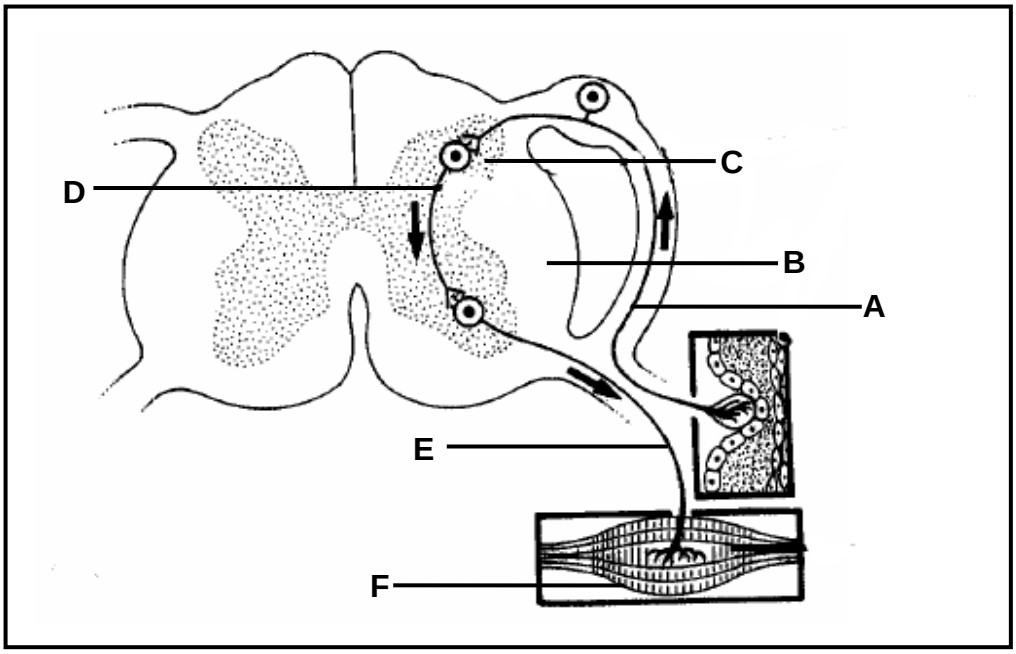
1.1.3 Which term best describes the development in birds where the young birds can move soon after hatching?

A Precocial development
B Altricial development
C Ovipary
D Ovovivipary

1.1.4 Which of the following cells undergo meiosis?

A Sperm cells in the seminiferous tubules
B Diploid cells in the seminiferous tubules
C Diploid cells in the fallopian tubes
D Somatic cells in the uterus

QUESTIONS 1.1.5 TO 1.1.7 ARE BASED ON THE DIAGRAM BELOW



1.1.5 The diagram represents ...

A a reflex arc.
B a cell body.
C the structure of a motor neuron.
D the corpus callosum.

1.1.6 The structures A, B, C and F in the CORRECT sequence are...

A Sensory neuron, grey matter, white matter and interneuron
B Sensory neuron, white matter, grey matter and effector
C Effector, motor neuron, sensory neuron and interneuron
D Sensory neuron, motor neuron, interneuron and effector

1.1.7 A synapse occurs between structures ...

A B and C.
B C and D.
C D and E.
D A and B.

1.1.8 Which of the following regarding a stimulus and the associated receptor is CORRECT?

A The retina is the receptor for light
B The tympanic membrane is the receptor for vibration
C The medulla oblongata is the receptor for head movement
D Maculae are the receptors for head position.

(8 x 2) **(16)**

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) in the ANSWER BOOK.

1.2.1 The collective name of the membranes which protect the brain

1.2.2 The transparent membrane protecting the cornea

1.2.3 A structure in the brain that regulates appetite, thirst and sleep

1.2.4 The end product of meiosis in a female

1.2.5 The fatty layer that insulates the axon of a neuron

1.2.6 A plant hormone that promotes seed germination

1.2.7 The female hormone that causes ovulation

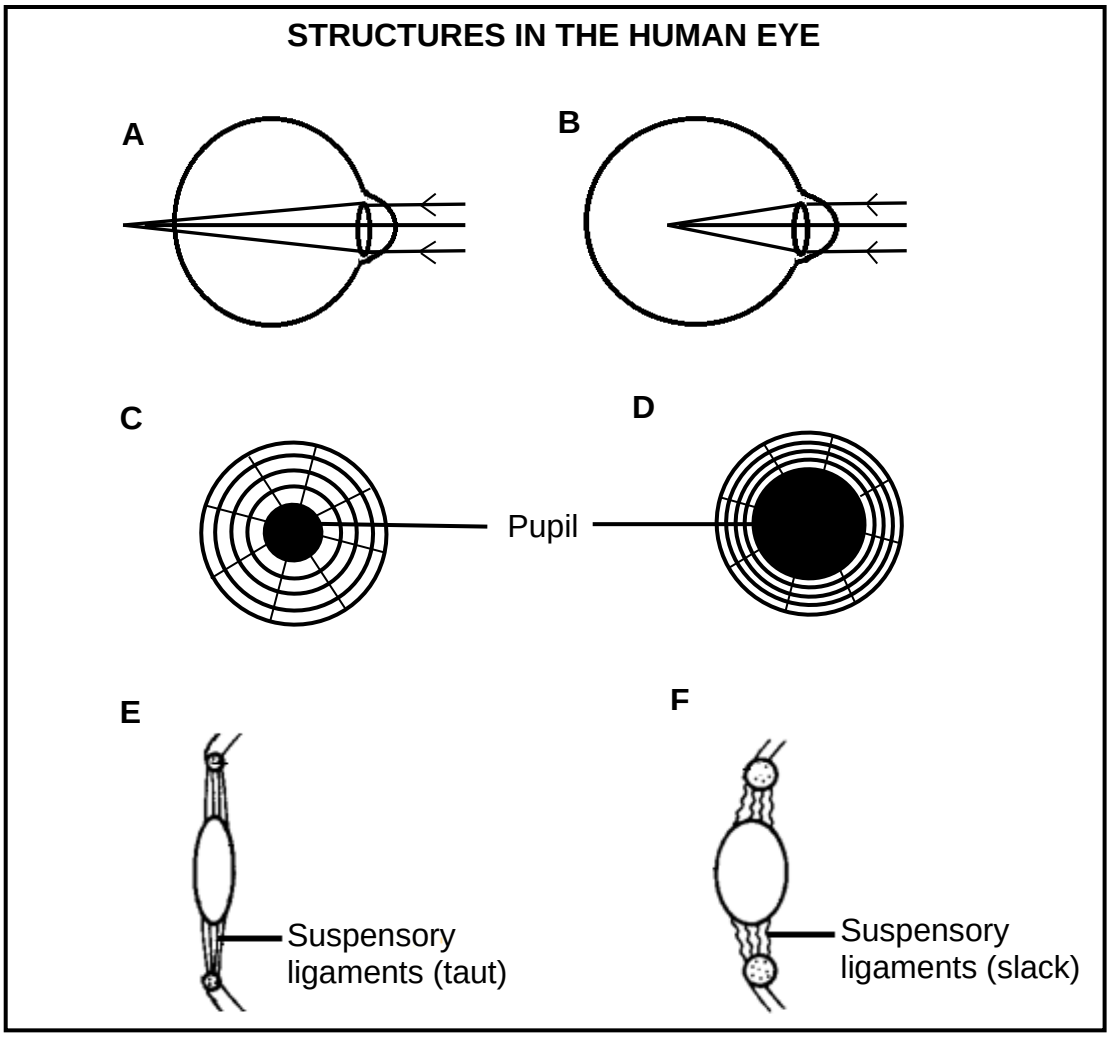
1.2.8 The practice of repeatedly planting large areas of land with a single crop type **(8)**

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 (1.3.1–1.3.8) in your ANSWER BOOK.

COLUMN I	COLUMN II
1.3.1 Prepares the body for an emergency situation	A: Sympathetic nervous system B: Adrenalin
1.3.2 A phase in meiosis where chromosome pairs align at the equator of the cell	A: Metaphase I B: Metaphase II
1.3.3 A disorder of the nervous system that causes memory loss	A: Alzheimer's disease B: Multiple sclerosis
1.3.4 Form part of the peripheral nervous system	A: Spinal nerves B: Cranial nerves
1.3.5 A nerve which transmits impulses to the cerebrum	A: Optic nerve B: Auditory nerve
1.3.6 A structure that is found on a chromosome	A: Centromere B: Centrosome
1.3.7 A treatment for ear infections	A: Cochlear implants B: Cataracts
1.3.8 Occurs during meiosis II	A: Homologous pairs align at the equator of the cell B: Crossing over

(8 x 2) **(16)**

1.4 The diagram below shows structures in the human eye.



1.4.1 Identify the eye defects that are represented by diagrams:

(a) **A** (1)

(b) **B** (1)

1.4.2 Give the LETTER only of the diagram that represents the eye:

(a) In conditions of bright light (1)

(b) When looking at an object less than six metres away (1)

(c) That can be corrected with a concave lens (1)

1.4.3 NAME the muscle that contracts in diagram:

(a) **C** (1)

(b) **D** (1)

(c) **F** (1)

1.4.4 Name the fluid found in the eye between the lens and the retina. (1)

1.4.5 Name the mechanism responsible for changing the shape of the lens. (1)
(10)

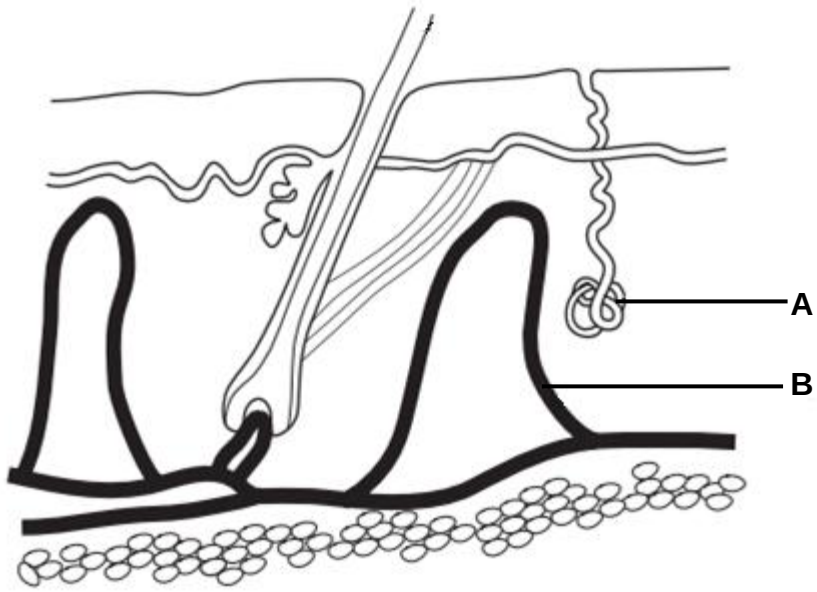
TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The diagram below shows a part of the human skin.

PART OF THE HUMAN SKIN



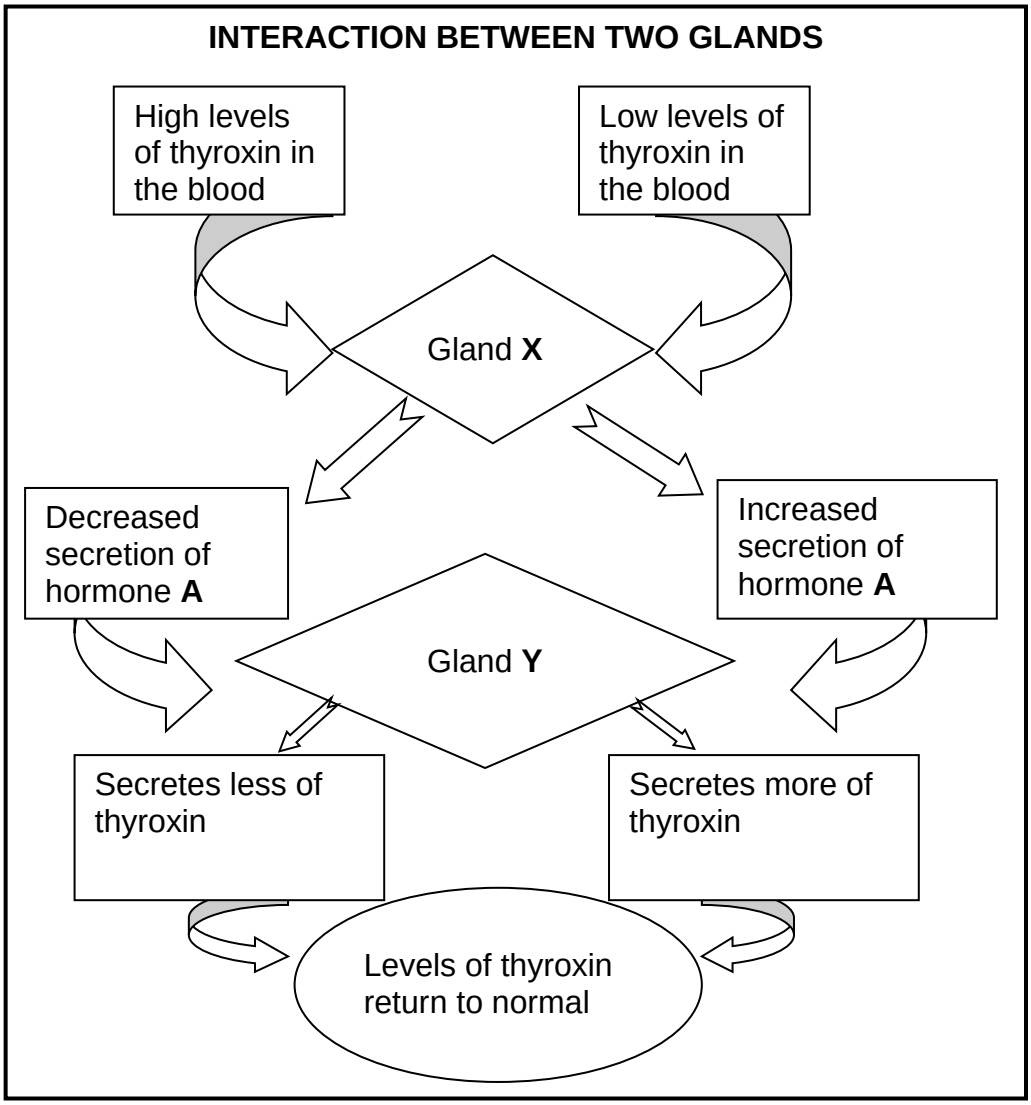
2.1.1 Identify the part labelled **A**. (1)

2.1.2 Explain the role of:

(a) Part **A** in thermoregulation on a hot day. (2)

(b) Part **B** in thermoregulation on a cold day. (2)
(5)

2.2 The flow diagram below shows the interaction between two glands (**X** and **Y)** in the human body.



2.2.1 List TWO functions of thyroxin. (2)

2.2.2 Identify :

(a) Gland **X** (1)

(b) Hormone **A** (1)

2.2.3 Explain what would happen to levels of hormone **A**, if gland **Y** was not able to produce thyroxin. (4)
(8)

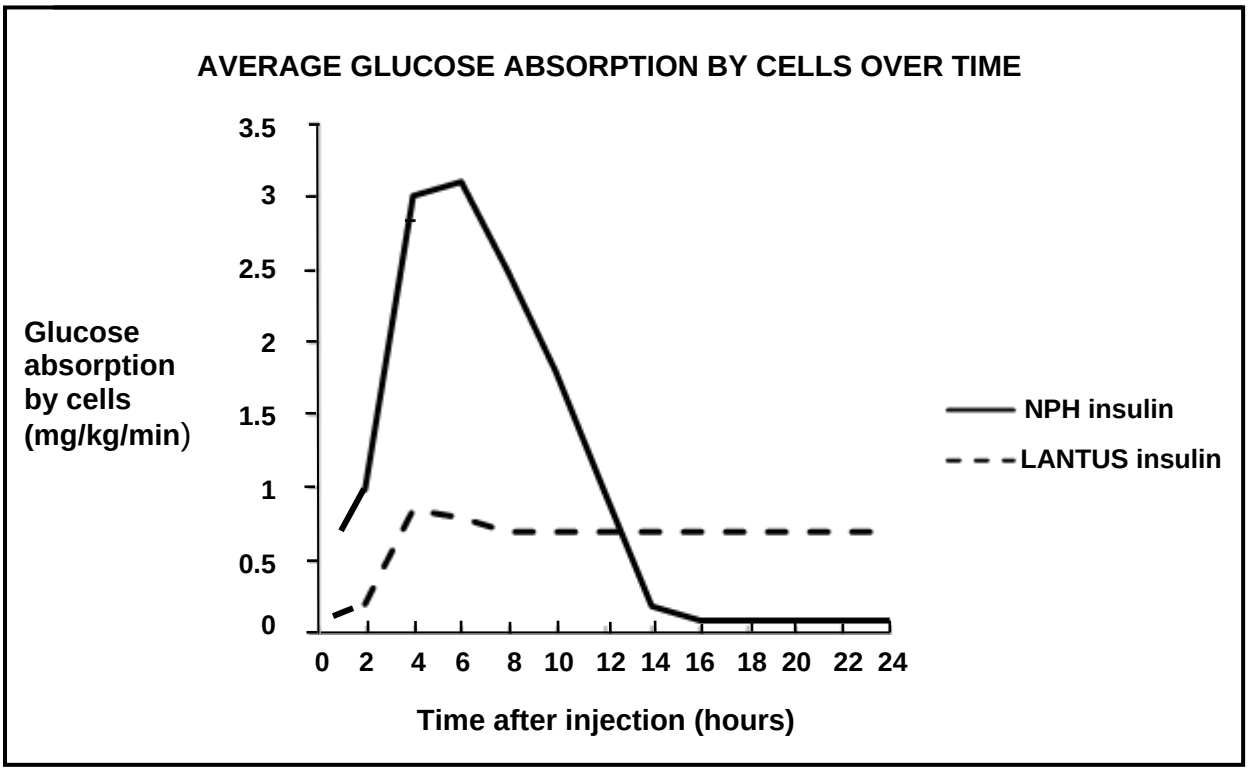
2.3 Insulin is the hormone that regulates blood glucose levels. Some patients have a condition where they are unable to produce insulin and must therefore have regular injections of insulin. Two types of insulin are used, NPH insulin and LANTUS insulin.

Scientists wanted to establish which of these types of insulin controls blood glucose levels for longer periods in insulin-dependent patients.

- They divided 20 patients into two groups of 10 patients each.
- The one group was injected with NPH insulin and the other group was injected with LANTUS insulin.
- All the patients received the same amount and concentration of insulin.
- The glucose absorption by cells was then measured every hour, over a period of 24 hours and the average calculated.

The insulin is regarded as effective when the glucose uptake by the cells is above 0,4mg/kg/min

The graph below shows the results obtained from this investigation.



2.3.1 Provide a suitable hypothesis for this investigation. (2)

2.3.2 Name the condition that results when the body is unable to produce insulin (1)

2.3.3 Name TWO factors, not mentioned above that should have been kept constant during this investigation. (2)

2.3.4 Describe how the average glucose absorption would be calculated for a group. (2)

2.3.5 How long after the injection did the insulin remain effective with LANTUS? (1)

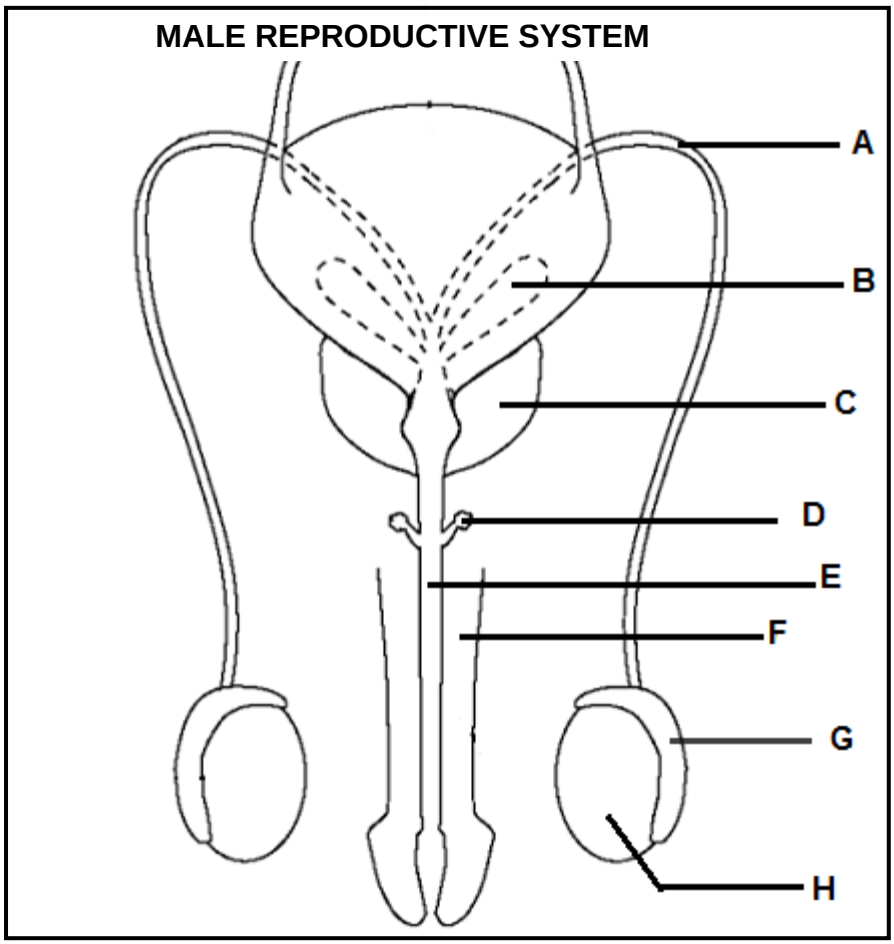
2.3.6 Which insulin caused the highest glucose absorption by cells? (1)

2.3.7 Which insulin would be recommended for the insulin dependent patients? (1)

2.3.8 Give a reason for your answer to QUESTION 2.3.7 (1)

2.3.9 Explain how insulin functions to reduce blood glucose levels. (2)
(13)

2.4 The diagram below shows the human male reproductive system.



2.4.1 Give the LETTERS only of THREE glands. (3)

2.4.2 What is the function of structure labelled **G**? (1)

2.4.3 Explain how fertility would be affected if gland **C** was removed. (2)

2.4.4 Explain how pregnancy would be prevented if part labelled **A** is cut and sealed on both sides. (2)

2.4.5 Would the operation mentioned in QUESTION 2.4.4 prevent the spread of sexually transmitted diseases? (1)

2.4.6 Give a reason for answer to QUESTION 2.4.5 (1)

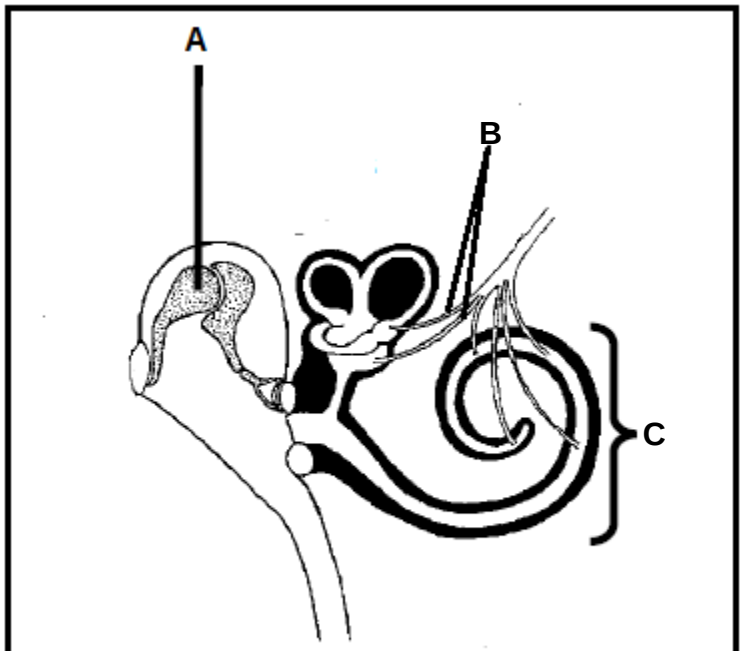
2.4.7 Describe how the male reproductive system is suited for internal fertilisation. (2)

2.4.8 Give ONE advantage of internal fertilisation. (2)

(14)
[40]

QUESTION 3

3.1 The diagram below shows structures that form part of the human ear.



STRUCTURES IN THE EAR

3.1.1 Identify:

(a) The ossicle **A** (1)

(b) Structure **C** (1)

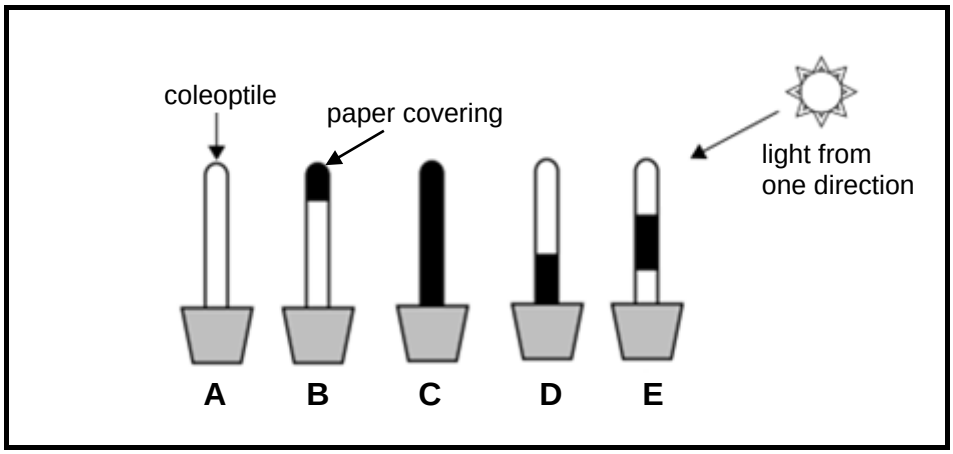
3.1.2 Explain how each of the structures of the outer ear is suited to perform its function. (4)

3.1.3 The structure **B** can become infected by a virus, thereby causing it to be damaged. Explain what effect this would have on the person. (2)
(8)

3.2 Grass seedlings were used in an experiment to investigate the role of auxins in the growth response to light.

The following procedure was followed:

- Parts of the seedlings (coleoptiles) were covered with black paper.
- Light could not reach any of the parts covered by the paper, but could fall on the uncovered parts of the coleoptiles.
- The different conditions were labelled **A** to **E**



3.2.1 What is the growth response of plants to light called? (1)

3.2.2 Give the LETTERS only of those tips that will bend towards the light. (3)

3.2.3 Explain your answer to QUESTION 3.2.2 (3)

3.2.4 What is the purpose of the setup at **A**? (1)

3.2.5 Predict a conclusion for this experiment. (2)
(10)

3.3 Read the article below.

> Poor farming techniques, rather than drought, was the main reason why a hectare of arable land (land suitable for cultivation) in Africa produced less than half the amount of crop as the rest of the developing world.
>
> While unreliable weather patterns have been identified as another factor contributing to food insecurity, this factor was not sufficient to explain the high levels of undernourishment.
>
> Researchers said two basic, but essential farming techniques were not practised widely enough in Africa - irrigation and the application of fertiliser.
>
> The problem is that irrigation is costly on a continent that is the world's poorest. Also it has been shown that African farming is affected due to a lack of the large river systems needed for irrigation.
>
> Sub-Saharan Africa would need to double its crop output in order to eliminate hunger and malnourishment on the continent.
>
> [http://www.iol.co.za/news/africa]

3.3.1 According to this passage, mention TWO ways in which food security in Africa could improve. (2)

3.3.2 Besides poor farming practices, name ONE other factor, mentioned in the article that may be the cause of decreased crop production in Africa. (1)

3.3.3 Give ONE reason, according to the article, why there is reduced water availability to farms in Africa. (1)

3.3.4 Describe how the use of fertilisers may lead to reduced water quality. (4)
(8)

3.4 Recycling is one way of reducing the carbon footprint. The table below shows the mass of different materials recycled in the years 2004 and 2010.

Mass of different materials recycled for the years 2004 and 2010

TYPE OF MATERIAL	MASS (in millions of tons)	
	2004	2010
Paper	2,5	3,0
Glass	1,0	1,7
Plastic	0,4	0,6
Wood	0,8	0,9

Adapted from: http://sawic.environment.gov.za/documents/1567.docx

3.4.1 Use the information in the table to plot two bar graphs on the same system of axes. (7)

3.4.2 Calculate the percentage increase in the mass of paper recycled from 2004 to 2010. (2)

3.4.3 Which material was recycled the least in both years? (1)

3.4.4 Give TWO possible explanations for the difference in the amount of recycling from 2004 to 2010. (4)

(14)
[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

Describe how the various parts of the female reproductive system function to protect and nourish the developing embryo and foetus.

Content: (17)
Synthesis: (3)
(20)

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

TOTAL SECTION C: 20
GRAND TOTAL: 150

END