LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES – PAPER 1

SEPTEMBER 2022

MARKS: 150

DURATION: 2½ HOURS

ELFSCP1

This question paper consists of 17 pages

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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 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. Do ALL drawings in pencil and label them in blue or black ink.
7. Draw diagrams, flow charts or tables 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 compass, where necessary.
11. Write neatly and legibly.

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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 to D) next to the question number (1.1.1 to 1.1.10) in the ANSWER BOOK, e.g. 1.1.11 D.

1.1.1 If a cell from the human body has 23 chromosomes, it is...
A. a zygote
B. diploid
C. a gamete
D. a somatic cell

1.1.2 Which part of the brain interprets impulses from the retina of the eye?
A. medulla oblongata
B. cerebrum
C. cerebellum
D. corpus callosum

1.1.3 Which ONE of the following is the function of the cerebellum?
A. Receives and interprets sensory information
B. The centre for control of breathing
C. The maintenance of equilibrium and balance
D. The centre for regulation of body temperature

1.1.4 When the tension of the suspensory ligaments in the human eye increases, the...
A. lens becomes more convex
B. eye is focussed for distant vision
C. pupil dilates
D. lens bulges

1.1.5 In humans fertilisation takes place in the...
A. Fallopian tubes
B. vagina
C. uterus
D. ovary

1.1.6 When a person drinks 340ml of water more than the daily quantity, then approximately 340ml more urine should be excreted. If an amount of salt is ingested with water, less urine will be produced. The reason is that:
A. Salt water is absorbed by the tissues
B. The renal tubules will reabsorb less water
C. The renal tubules will reabsorb more water
D. Less aldosterone will be secreted

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1.1.7 The list below shows the stages involved in the negative feedback mechanism:

(i). Effectors bring about corrective responses
(ii). A receptor detects a change in the internal environment
(iii). Factor brought back to normal
(iv). Hormonal messages are sent to the effectors

Which of the following shows the correct order in which these stages occur?

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

1.1.8 The hormone responsible for the development of female secondary sexual characteristics is...?
A. testosterone
B. progesterone
C. oestrogen
D. FSH

1.1.9 Which ONE of the following occurs as a result of the regular cutting of the apical buds of a tree?
A. The tree grows shorter
B. The tree grow towards the source of light
C. The tree remains the same size
D. The tree produces more lateral buds

1.1.10 Which ONE of the following structures plays a role in cooling the human body?

A. Blood capillaries in the skin
B. Medulla oblongata
C. Renal tubules
D. Mammary glands (10 x 2) **(20)**

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1.2 Give the correct **biological term** for each of the following description Write only the term next to the question numbers (1.2.1 to 1.2.10) in the ANSWER BOOK.

1.2.1 The unpaired gland in the male reproductive system that secretes an alkaline fluid

1.2.2 Membranes that surround and protect the brain and spinal cord

1.2.3 The hormone that prepares the body for an emergency by increasing the heart rate and the breathing rate

1.2.4 The structure in the sperm cell that contains enzymes to digest the outer layer of the ovum

1.2.5 The structure in the ear that absorbs excess vibrations to prevent echoes

1.2.6 An embryo consisting of a hollow ball of cells

1.2.7 Specialised cells that receive the stimulus of light and convert it to an impulse

1.2.8 The ability to see with both eyes where each eye produces a slightly different image of the same object and allows one to judge distance

1.2.9 The breaking of the inner lining of the uterus that is accompanied by bleeding

1.2.10 The process whereby diploid cells in the testes give rise to sperm cells

(10 x 1) **(10)**

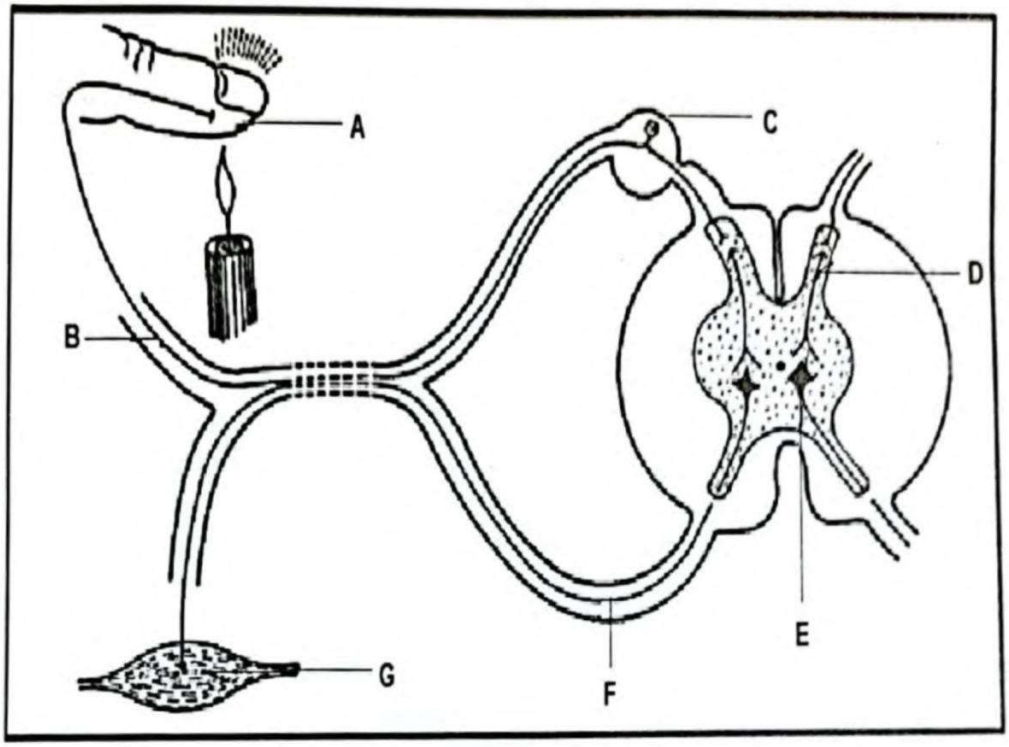
1.3 Indicate whether each of the statements in COLUMN I applies to **A ONLY, B ONLY, BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only, B only, Both A and B or None** next to the question number (1.3.1 to 1.3.3) in the ANSWER BOOK.

COLUMN I	COLUMN II
1.3.1 Secreted by the corpus luteum	A. Oestrogen B. Progesterone
1.3.2 A brain disorder that causes memory loss	A. Alzheimer's disease B. Astigmatism
1.3.3 Causes the conversion of glucose to glycogen	A. TSH B. Aldosterone

(3x2) **(6)**

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1.4 The diagram below represents a reflex arc



1.4.1 Give the LETTER and the NAME of the part that:

(a) Transmits impulses to the central nervous system (2)

(b) Is probably damaged if a person is able to detect the stimulus, but cannot respond. (2

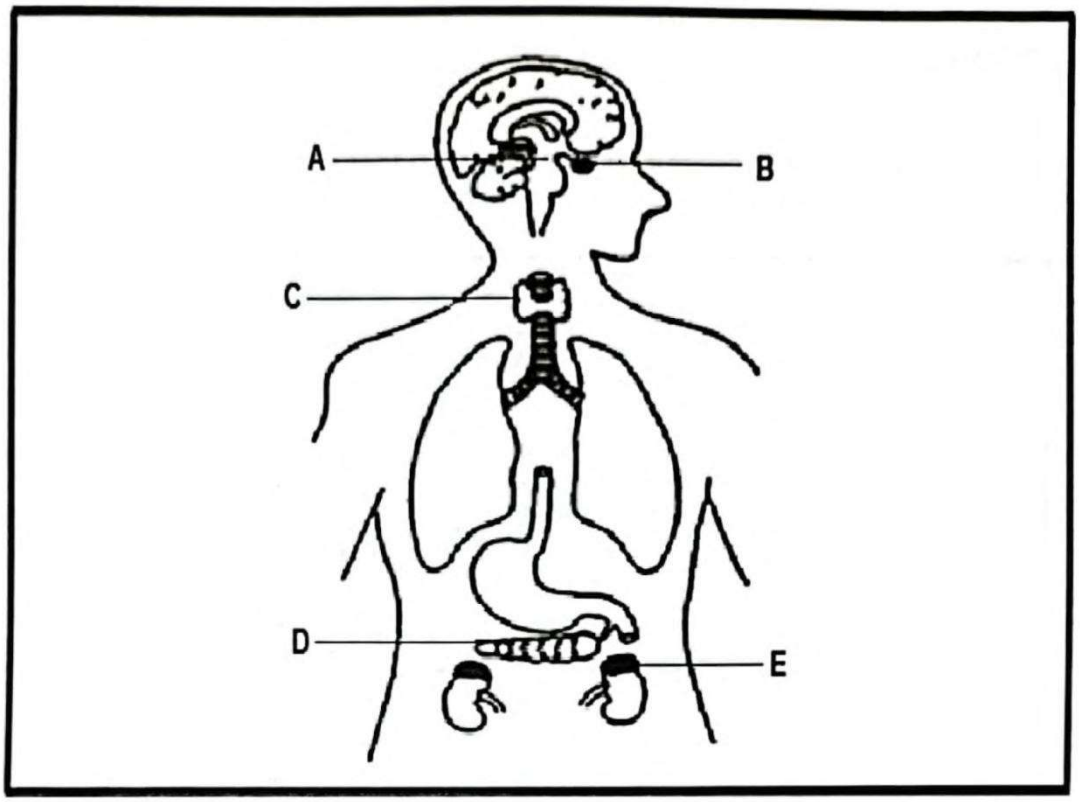
(c) Responds to the original stimulus (2)

1.4.2 State if the nerve impulse travels from **A** to **G** or from **G** to **A** (1)

(7)

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1.5 The diagram below shows some structures in the human body



1.5.1 Identify part:

(a) **A** **(1)**

(b) **E** **(1)**

1.5.2 Give the LETTER and NAME of the structure that:

(a) Controls the secretions of other endocrine glands **(2)**

(b) Secretes a hormone that regulates metabolic rate **(2)**

1.5.3 Name the condition where gland labelled **C** enlarges due to a deficiency in iodine **(1)**

(7)

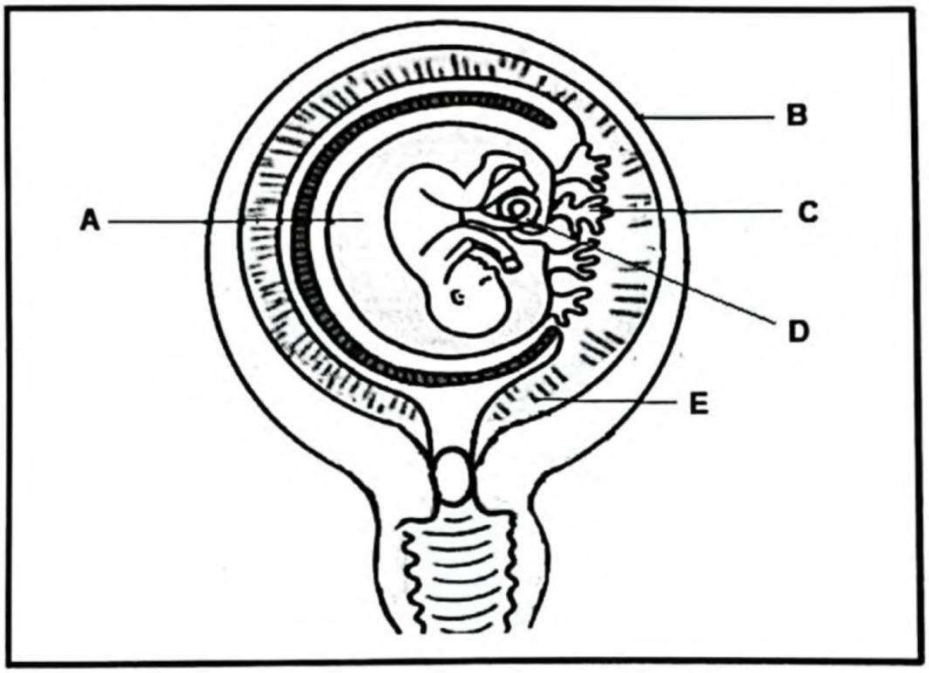
TOTAL SECTION A: 50

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SECTION B

QUESTION 2

2.1 The diagram below represents the developing foetus in the female's body.



2.1.1 Identify the parts labelled:

(a) **D** (1)

(b) **E** (1)

2.1.2 Name TWO substances present in high concentrations in the artery found in structure **D.** (2)

2.1.3 State THREE functions of the fluid labelled **A.** (3)

2.1.4 Explain how the part labelled **B** is structurally suited to perform its function during the process of birth. (2)

2.1.5 Name TWO systems in the baby's body that take over the functions of **C** once the baby is born (2)

(11)

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2.2 Explain the consequence on human reproduction if a male wears tight-fitting underwear all the time **(3)**

2.3 Some females use an ovulation monitor so that they can be aware of the days when they are fertile. These monitors measure the level of hormones in the blood

(a) Why would females want to know when they are fertile? (1)

(b) Explain which hormone is likely to be monitored by the ovulation monitor (3)
(4)

2.4 Grade 12 learners investigated the effects of two plant growth substances, Gibberellins and Auxins on apical dominance. The apical buds of nine pea plants of the same species, age and height were removed. These plants were then divided into three groups. In each group the cut surface of the remaining shoot (growing stem) of the pea plants was treated in one of the following ways:

Group 1: Coated with a paste containing gibberellins of the same concentration

Group 2: Coated with a paste containing auxins of the same concentration

Group 3: Coated with a paste only (containing no plant growth hormones)

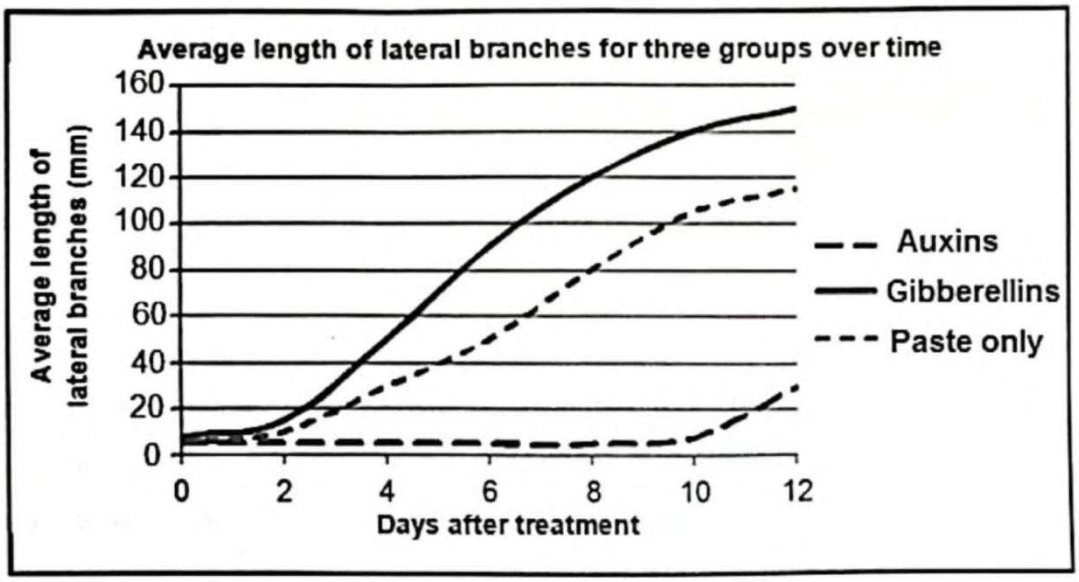
The hormones diffuse into the plant until no more hormones remain in the paste

The treated plants were all grown under the same conditions in the laboratory.

The length of the lateral branches of each plant was measured after every two days for a period of 12 days. Measurements were taken at the same time for all treated plants and the average for each group was calculated

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The results of the investigation are shown in the graph below



2.4.1 State ONE function of the gibberellins that led to the results obtained in this investigation. (1)

2.4.2 Calculate the difference in the average length of the lateral branches between the plants treated with gibberellins and the plants treated with the paste only on the 8th day after the treatment. Show ALL working. (3)

2.4.3 State TWO ways in which the reliability of the results could be increased. (2)

2.4.4 State TWO factors that should have been kept constant in all the groups. (2)

2.4.5 Use the results to explain the effect of auxins on the growth of lateral branches. (4)

(12)

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2.5 Read the following extract on multiple sclerosis

> Multiple sclerosis is a disorder that causes inflammation of nervous tissue in any area of the central nervous system (CNS) and affects about 1 in 1600 people in South Africa. The first signs of multiple sclerosis are vision problems, weakness or fatigue, pains and spasms, cognitive problems and problems with bladder control. It is thought that multiple sclerosis is caused by a combination of factors, such as viruses, heredity, the environment and auto-immunity. Auto-immunity is when the body attacks its own nervous tissue. In the case of multiple sclerosis, the myelin sheath of the axons break up and there is inflammation of white matter in the CNS. Drugs are used to treat people with multiple sclerosis, but there is no cure.

2.5.1 Name the structures that make up the CNS (2)

2.5.2 State TWO functions of the myelin sheath (2)

2.5.3 Give TWO possible causes of multiple sclerosis (2)

2.5.4 From the extract, name TWO symptoms of multiple sclerosis (2)
(8)

2.6 Describe the structure and functioning of the autonomic nervous system **(4)**

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2.7 The diagram below show different reproductive strategies in animals.

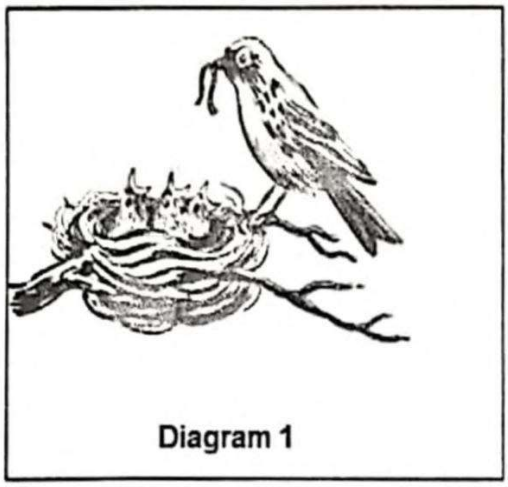


Diagram 1

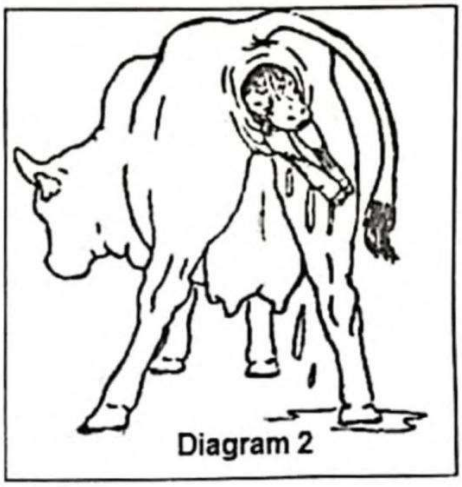


Diagram 2

2.7.1 Identify the developmental strategy shown in:

(a) Diagram 1 (1)

(b) Diagram 2 (1)

2.7.2 State TWO characteristics of the young, born of organisms to your answer in QUESTION 2.7.1(b) (2)

2.7.3 Explain the advantage of ovovivipary over ovipary as a reproductive strategy (4)

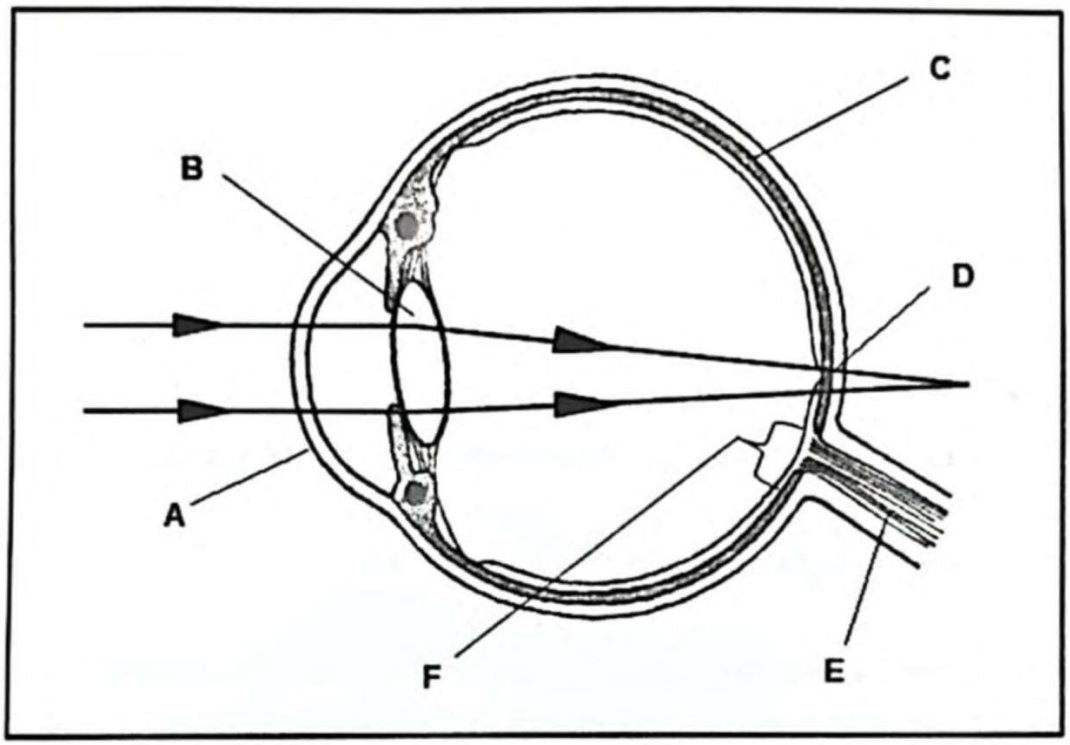
(8)

TOTAL QUESTION: [50]

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QUESTION 3

3.1 The diagram below represents the structure of the human eye.



3.1.1 Give the LETTER of the part which:

(a) Supplies nutrients and oxygen to the eye (1)

(b) Transmits impulses to the cerebrum (1)

3.1.2 Name the visual defect that is shown in the diagram (1)

3.1.3 State TWO causes of the defect mentioned in QUESTION 3.1.2 (2)

3.1.4 Explain why when looking at a flower directly in front of you, the flower appears clear, but the trees in the distance appear blurred (4)
(9)

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3.2 Dale took part in an experiment on the eye's response to light. A lamp was placed at six different positions from Dale's face. The diameter of Dale's pupil was measured at each position. The results are shown in the table below.

Position of the lamp	**Diameter of the pupil (mm)**
A	2,2
B	2,8
C	3,4
D	4,0
E	4,6
F	5,2

3.2.1

(a) At which position was the lamp furthest away from the eye? (1)

(b) Explain your answer to Question 3.2.1 (a). (2)

3.2.2 When the lamp was moved from position **E** to position **F**, describe the process that caused the change in the diameter of the pupil (4)

(7)

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3.3 An investigation was conducted to determine the change in the diameter of a healthy follicle in the human ovary over the different days of the menstrual cycle.

A sample of 100 women aged between 25 and 30, with regular menstrual cycles, was used for this investigation.

The average follicle diameters of all 100 women during their menstrual cycles were measured and recorded

The following results were obtained from this investigation.

DAYS WHEN FOLLICLES WERE MEASURED	AVERAGE DIAMETERS OF THE FOLLICLES (mm)
5	6,9
10	13,3
13	18,8
14	22,0
20	3,4
25	2,6

3.3.1 For the investigation, state the:

(a) Dependent variable (1)

(b) Independent variable (1)

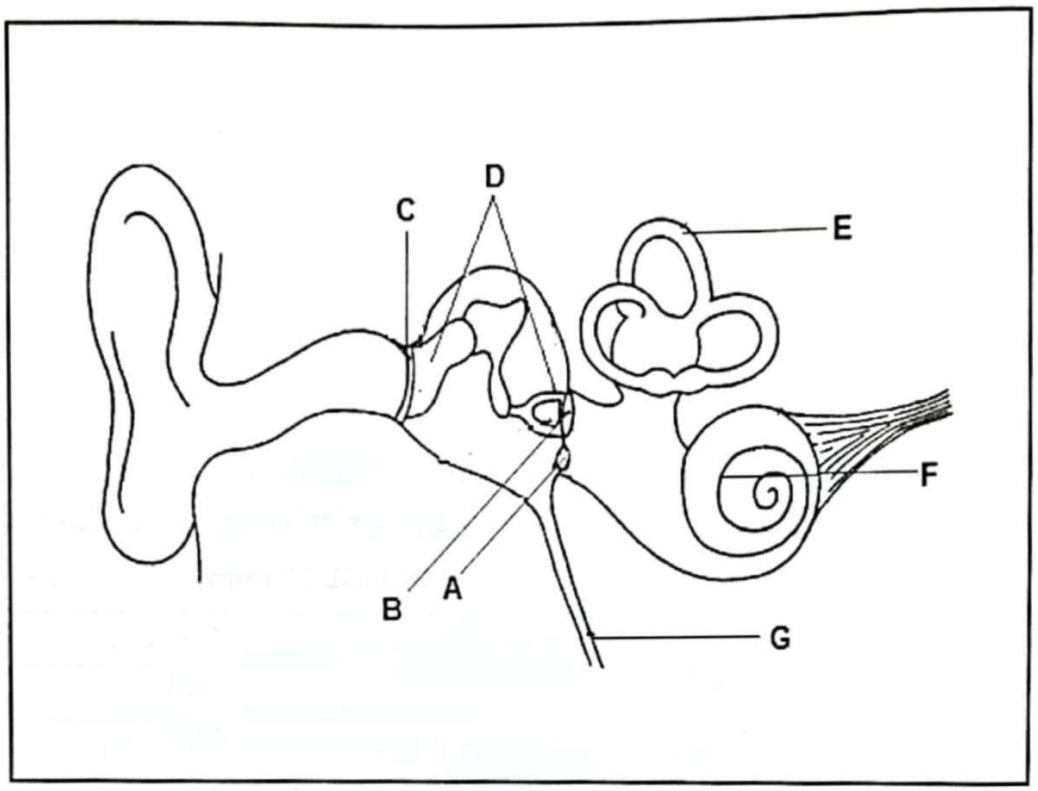
3.3.2 Name THREE planning steps that had to be considered before carrying out the investigation (3)

3.3.3 Explain the changes in the follicle diameters from day 14 to day 25 (3)

3.3.4 Explain how the results would probably differ if all the women used contraceptive pills that contained a high level of progesterone (3)
(11)

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3.4 Study the diagram of the human ear



3.4.1 Identify structures:

(a) **D** (1)

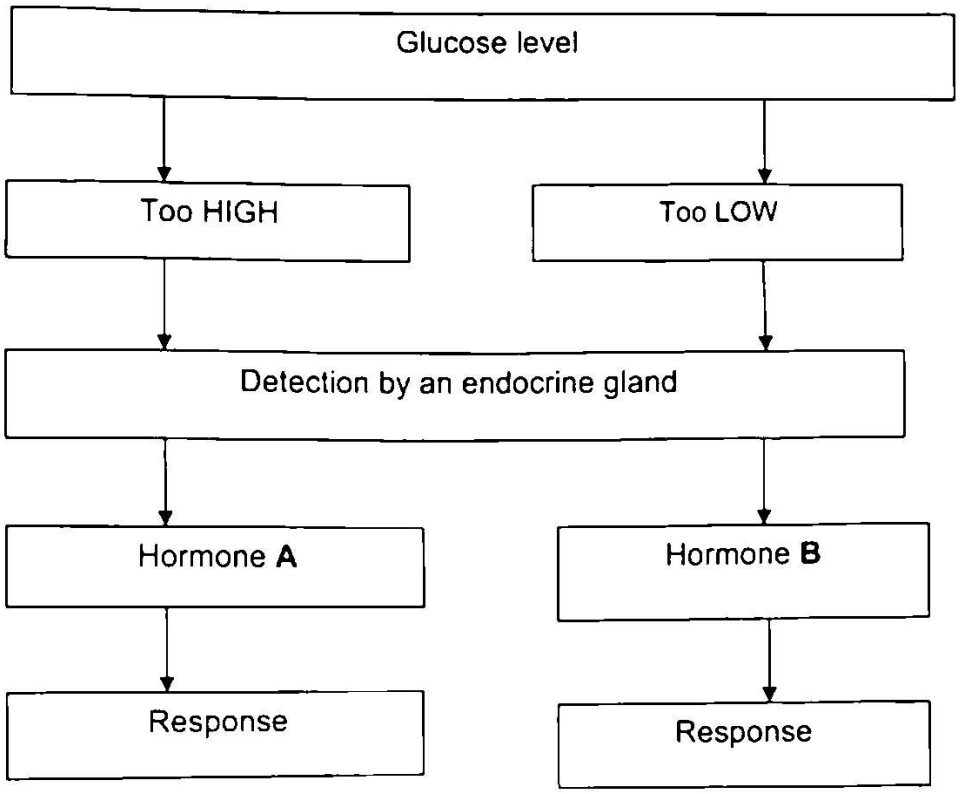
(b) **F** (1)

3.4.2 Explain how structures **B** and **C** contribute to the amplification of sound (2)

3.4.3 Describe how structure **E** restores balance when the position of the head changes (5)
(9)

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3.5 The flow diagram below shows the homeostatic control of blood glucose



3.5.1 What is an endocrine gland? (2)

3.5.2 Identify:

(a) Hormone **A** (1)

(b) Hormone **B** (1)

3.5.3 Name the gland that secretes the hormones mentioned in QUESTION 3.5.2 (1)

3.5.4 Explain the consequences for a person if the gland mentioned in question 3.5.3 fails to secrete hormone **A** (4)
(9)

3.6 Describe osmoregulation in humans when a person has not had enough water to drink **(5)**

TOTAL QUESTION 3: [50]

TOTAL SECTION B: 100

GRAND TOTAL: 150

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