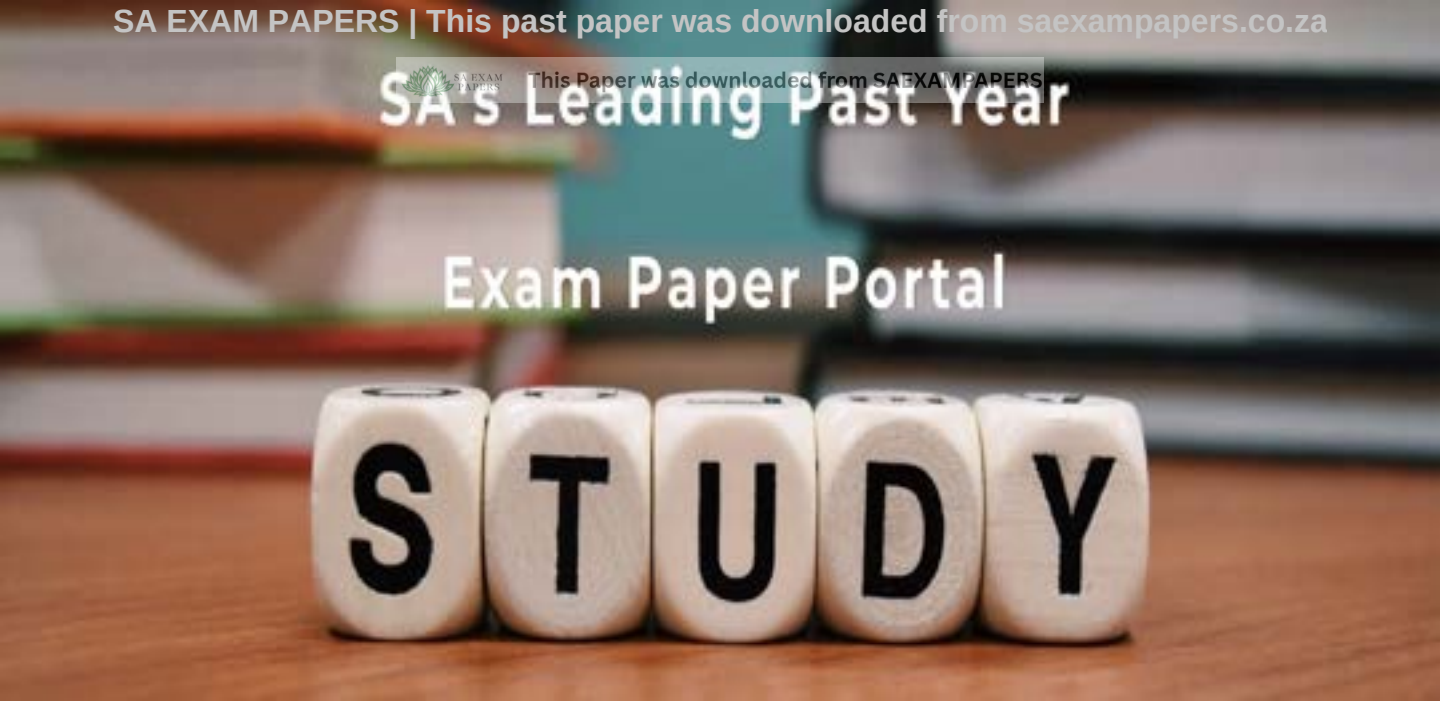


education

Department of Education
FREE STATE PROVINCE

PREPARATORY EXAMINATION

GRADE 12

LIFE SCIENCES P1

SEPTEMBER 2025

MARKS: 150

TIME: 2½ HOURS

This question paper consists of 21 pages.

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 for 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, a protractor, and a 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 to D) next to the question numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, for example, 1.1.11 D.

1.1.1 Which ONE of the following may function as an effector?

A Muscle
B Neuron
C Ganglion
D Ventral root

1.1.2 The reproductive strategy where the embryo develops inside the uterus and is born alive.

A Ovipary
B Vivipary
C Ovovivipary
D Amniotic egg

1.1.3 An eye defect caused by the eyeball being too short:

A Short-sightedness
B Long-sightedness
C Cataracts
D Astigmatism

1.1.4 The following occurs during the pupillary mechanism in the iris.

(i) Circular muscles contract
(ii) Circular muscles relax
(iii) Radial muscles contract
(iv) Radial muscles relax

Which ONE of the following combinations occurs when a person enters a room with bright lights?

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

QUESTIONS 1.1.5 AND 1.1.6 ARE BASED ON THE DIAGRAM BELOW OF A PERSON WITH AN ENLARGED THYROID GLAND.

1.1.5 The disorder illustrated in the diagram above is …

A multiple sclerosis.
B a goitre.
C diabetes mellitus.
D Alzheimer's disease.

1.1.6 The disorder is caused by …

A oversecretion of growth hormone.
B an undersecretion of growth hormone.
C an imbalance in prolactin.
D an imbalance in thyroxine.

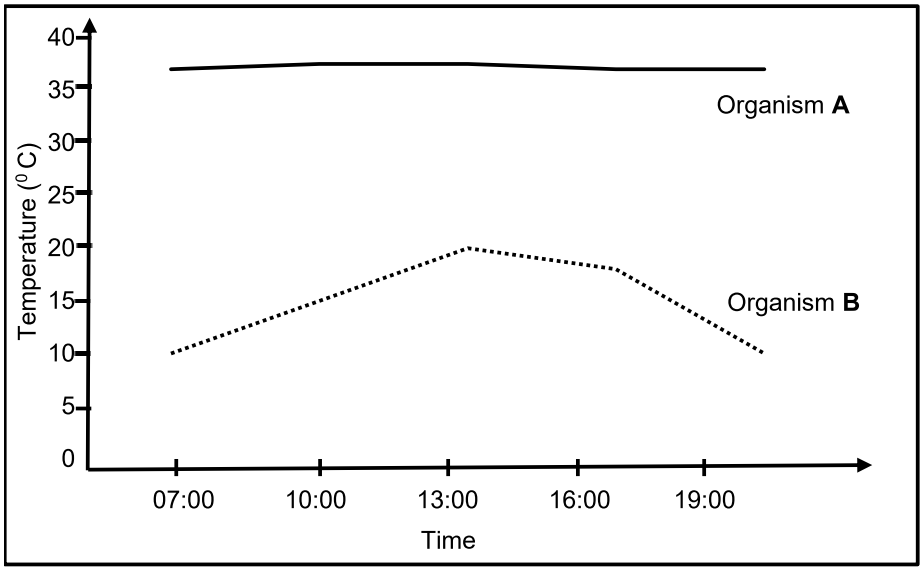
1.1.7 Which ONE of the following describes the peripheral nervous system?

A It is made up of cranial nerves and spinal nerves
B It is made up of the brain and spinal cord
C It secretes hormones
D It maintains a constant internal environment

1.1.8 A unilateral light source will cause …

A all plant hormones to move towards the light.
B auxin to move towards the light.
C all plant hormones to move away from the light.
D auxin to move towards the darker side of the stem.

1.1.9 The graph below shows the temperature variations of two organisms. One organism is exothermic; it does not generate enough metabolic heat to maintain its internal temperature. The other organism is endothermic; it could maintain a constant body temperature independent of the environment.



The conclusion that can be made from the results in the graph is that:

A Organism **A** is exothermic
B Organism **B** is endothermic
C Organism **A** represents a healthy human
D Organism **B** represents a human

1.1.10 Which of the following CORRECTLY represents the events involved in the secretion and action of ADH?

	Water level in blood	Amount of ADH secreted relative to normal	Amount of water reabsorbed by kidneys
A	Increase	Increase	Decrease
B	Increase	Decrease	Increase
C	Decrease	Increase	Increase
D	Decrease	Decrease	Decrease

(10 x 2) **(20)**

1.2 Give the correct **biological term** for each of the following descriptions. Write only the term next to the question numbers (1.2.1 to 1.2.9) in the ANSWER BOOK.

1.2.1 An interaction between two hormones in which hormones are stimulated or inhibited to restore balance

1.2.2 Glands that release their secretions via ducts into a body cavity or the exterior

1.2.3 The constriction of blood vessels near the skin surface, which decreases blood flow

1.2.4 The microscopic gap between two consecutive neurons

1.2.5 The period from fertilisation to birth in humans

1.2.6 The site of fertilisation in the female reproductive system

1.2.7 A tropic movement of a plant towards gravity

1.2.8 The process when the endometrium tears away from the uterine wall, accompanied by blood loss

1.2.9 A hollow ball of cells into which the fertilised ovum develops

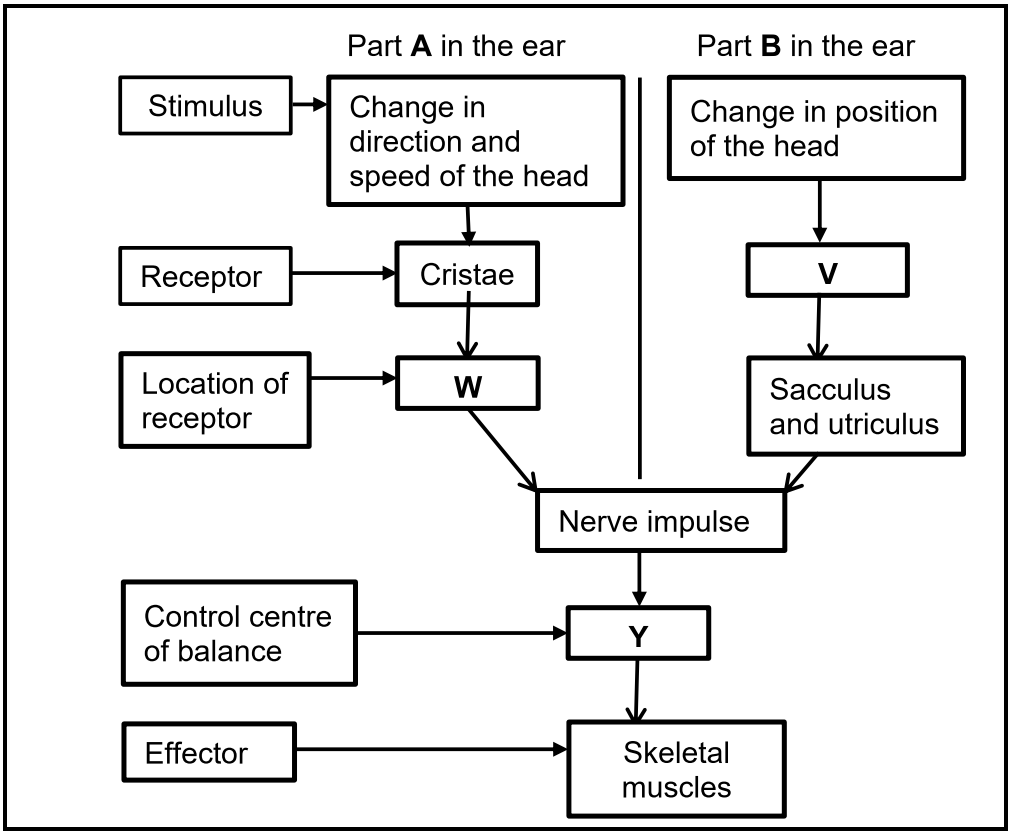
(9 x 1) **(9)**

1.3 Indicate whether each of the descriptions 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 numbers (1.3.1 to 1.3.3) in the ANSWER BOOK.

COLUMN I		COLUMN II
1.3.1	Produces an alkaline fluid which neutralises the acid in the vagina	A: Seminal vesicle B: Cowper's gland
1.3.2	Stores waste products in the amniotic egg	A: Allantois B: Yolk
1.3.3	Plant defence mechanism by using thorns	A: Chemical defence B: Mechanical defence

(3 x 2) **(6)**

1.4 The flow diagram below represents different parts of the human ear that maintain balance.



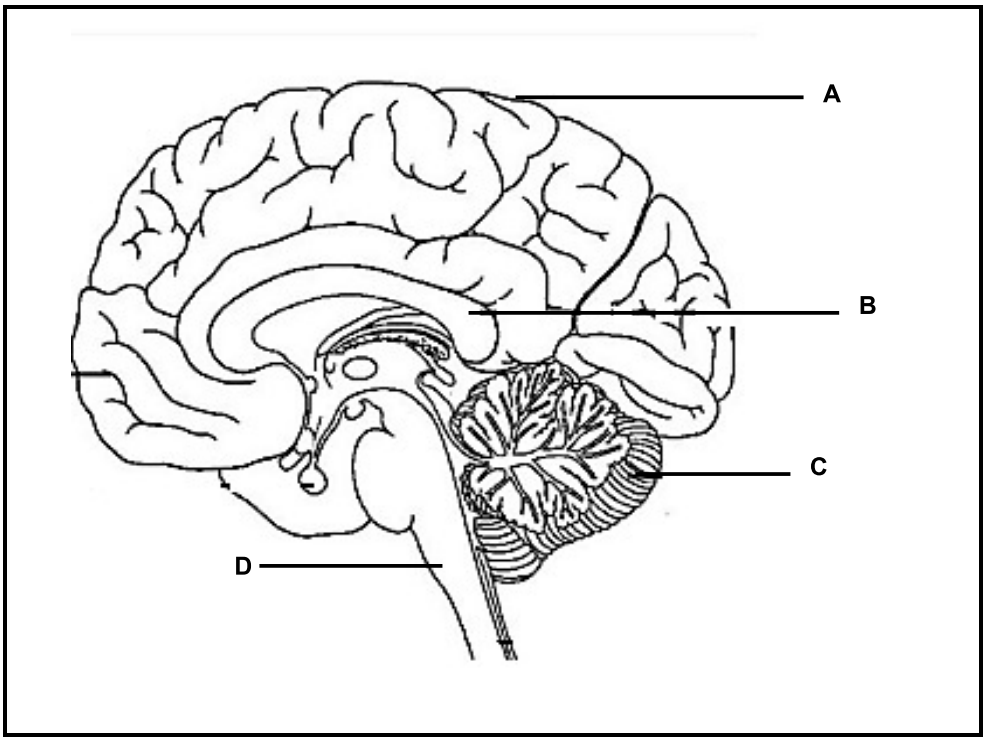
1.4.1 Identify:

(a) The receptor **V** (1)

(b) The location of receptor **W** (1)

(c) Control centre **Y** (1)
(3)

1.5 The diagram below represents the human brain.



1.5.1 Give the LETTER and NAME of the part that controls the following:

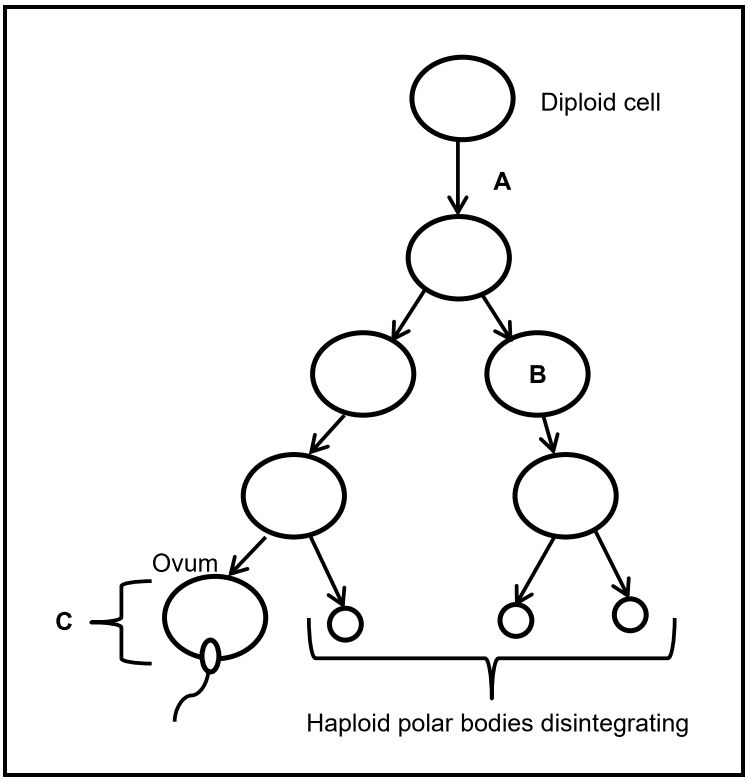
(a) Communication between the two hemispheres of the brain (2)

(b) Voluntary actions (2)

(c) Breathing (2)

1.5.2 Give TWO structures that protect the brain. (2)
(8)

1.6 The diagram below shows the process of the formation of an ovum in humans.



1.6.1 Name the type of meiotic cell division shown in the diagram above. (1)

1.6.2 Identify:

(a) Cell division at **A** (1)

(b) The chromosome number of cell **B** (1)

(c) The process at **C** (1)
(4)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 Read the extract.

Menstrual Irregularities Post Tubal Ligation

Tubal ligation is an irreversible method of control of birth in which the fallopian tube portion is tied or cut, clipped or removed. Tubal ligation may lead to menstrual irregularities (interference of blood supply to the ovaries which in the end interferes with the functioning of the ovaries).

When the blood supply of ovaries gets disturbed, follicles are incapable of growing properly and the corpus luteum growth gets affected too. Women who underwent tubal ligation also have higher levels of FSH.

An investigation was conducted to determine the frequency of menstrual irregularities after tubal ligation in women.

Menstrual irregularity occurs when the menstrual cycle gap of a female is less than 21 days or more than 35 days. The normal menstrual cycle of a female is between 21–35 days.

The procedure was as follows:

- Two groups of 63 female participants, aged between 32 and 42, were selected.
- One of the groups consisted of females who had tubal ligation, and the second group consisted of females who did not undergo tubal ligation.
- Laboratory examinations were done on all the females to check any damage which happened to the ovary.
- Counted the number of days in the menstrual cycle of each female.
- Conducted the investigation from 1st January 2019 to 30th June 2020
- Excluded females having menstrual irregularities due to organic disorders (such as ovarian cancer, and endometrial cancer) before tubal ligation.

The results of the investigation were recorded in the table below:

Duration of menstrual cycle gap	Number of females who had tubal ligation	Number of females who did not undergo tubal ligation
Less than 21 days	30	0
More than 35 days	33	0
Between 21–35 days	0	63

2.1.1 Identify the independent variable. (1)

2.1.2 State TWO ways in which the scientists ensured the reliability of their results. (2)

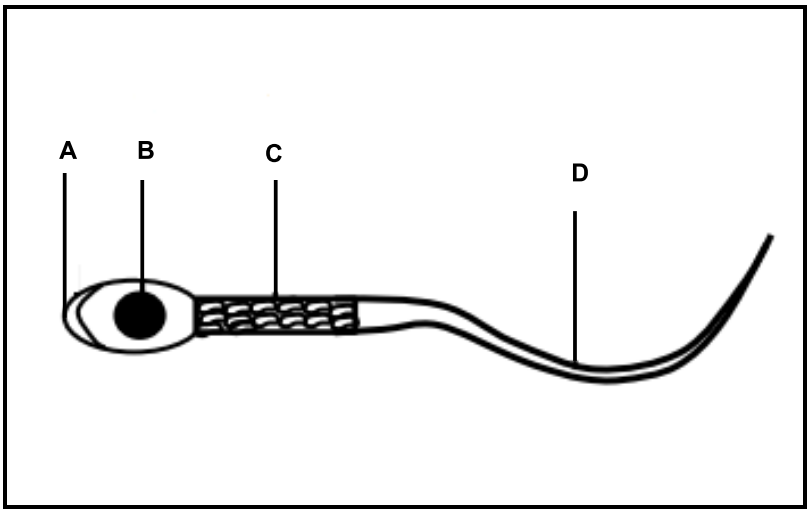
2.1.3 Why is it important to include 63 women who did not undergo tubal ligation in the investigation? (1)

2.1.4 Explain why females with menstrual irregularities due to organic disorder were excluded from the investigation. (2)

2.1.5 Describe how women who underwent tubal ligation also have a higher level of FSH. (5)

2.1.6 State a conclusion for this investigation. (2)
(13)

2.2 The diagram below shows the structure of a sperm cell.

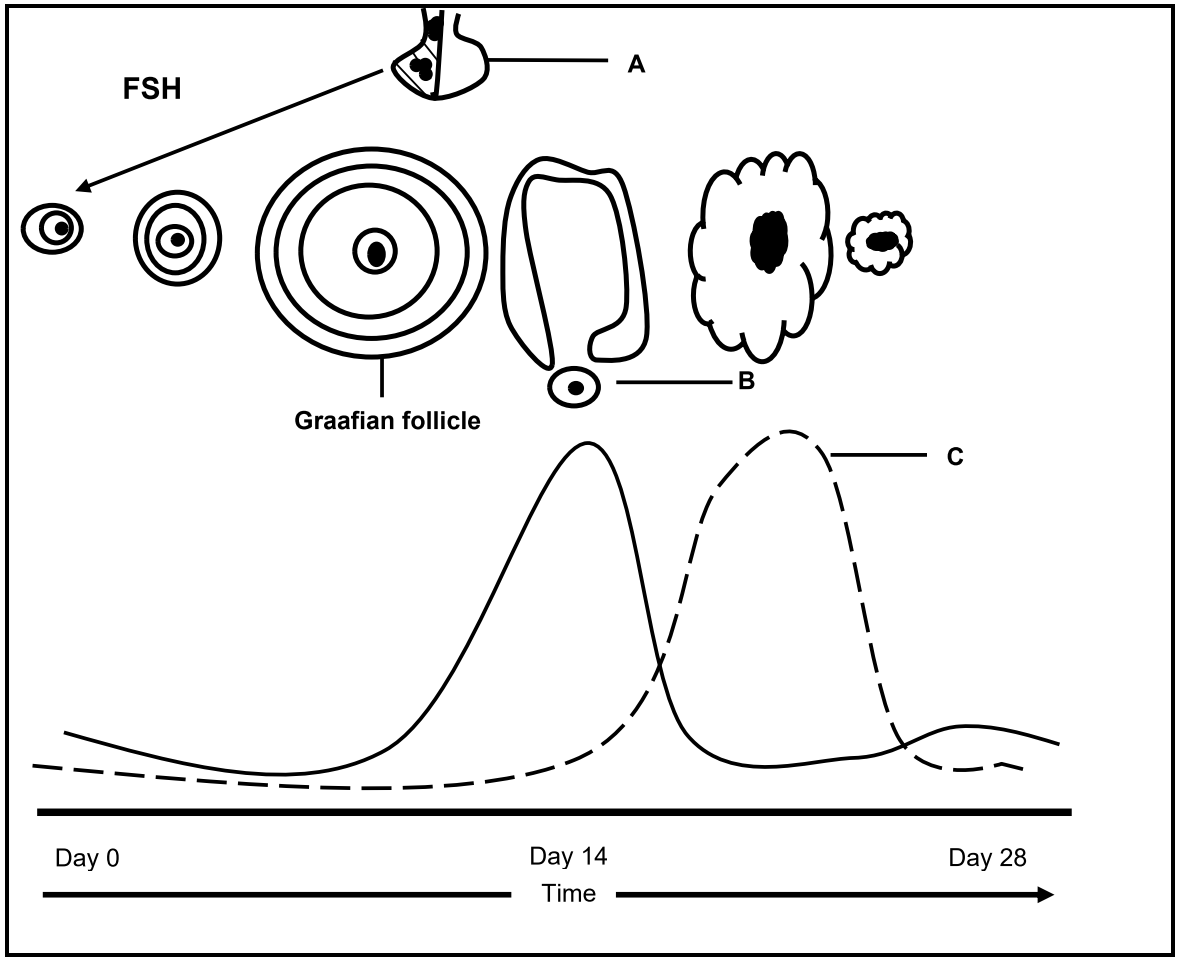


2.2.1 Give the LETTER corresponding to the part that contains enzymes responsible for digesting the outer layer of the ovum, enabling its penetration. (1)

2.2.2 Name the part of the sperm cell that carries hereditary characteristics. (1)

2.2.3 Explain how part **C** is adapted to ensure fertilisation. (4)
(6)

2.3 The diagram below represents different stages of follicle development and the graph represents ovarian hormone levels during the menstrual cycle over 28 days.



2.3.1 Identify:

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

(b) Process **B** (1)

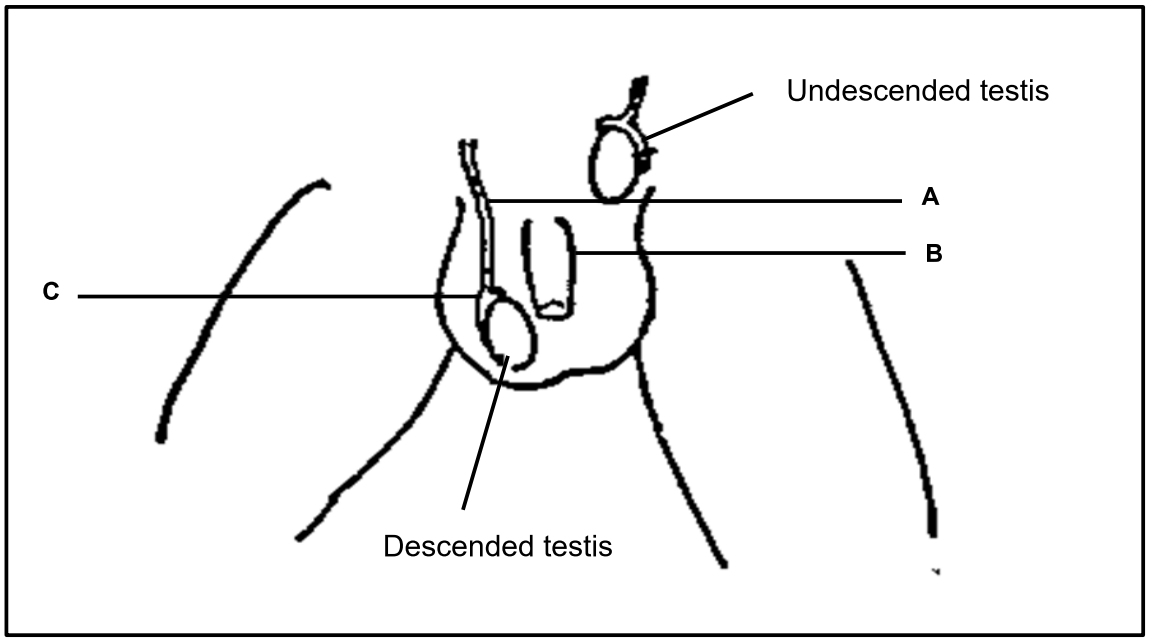
(c) Hormone **C** (1)

2.3.2 What evidence in the graph suggests that a Graafian follicle developed? (1)

2.3.3 Give TWO observable reasons in the diagram that fertilisation did not occur. (2)
(6)

2.4 Cryptorchidism is a medical condition where one or both of a boy's testes have not descended into their proper position in the scrotum before birth. In many cases, the undescended testis moves into the proper position within the first few months of life. If an undescended testis does not correct itself, surgery can relocate the testis into the scrotum.

The diagram below represents an adult male who has cryptorchidism.



2.4.1 Identify part:

(a) **A** (1)

(b) **B** (1)

2.4.2 Give ONE function of part **C**. (1)

2.4.3 From the paragraph, how can cryptorchidism be corrected? (1)

2.4.4 Explain how cryptorchidism will influence fertility if not corrected. (4)
(8)

2.5 The paragraph below refers to reproduction in crocodiles.

> All crocodiles lay hard-shelled fertilised eggs. A female crocodile lays an average of 12–48 eggs. The eggs are deposited into the soil, and the sun's heat and the heat from the natural decomposition of vegetation maintain a warm temperature that aids in the embryo's development. Until hatching occurs, the female remains close to the nest to protect the eggs from predators.
>
> After three months, the young are fully developed. While still in the egg, the young may utter squeaks, perhaps signalling that they are ready to emerge. The young crocodiles are born with their eyes open and are immediately mobile. The female remains close to her offspring and protects them from predators for several weeks to months.

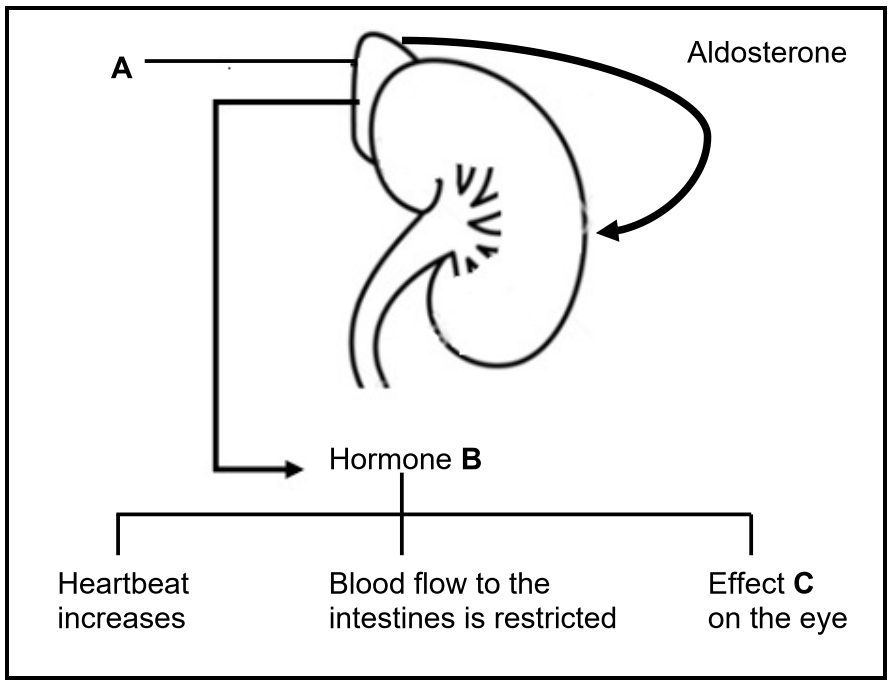
2.5.1 (a) State the type of fertilisation that occurs in crocodiles. (1)

(b) Explain ONE way in which this type of fertilisation in QUESTION 2.5.1(a) increases reproductive success in crocodiles. (2)

2.5.2 Name the reproductive strategy in crocodiles which relates to the developing embryo. (1)

2.5.3 Give TWO characteristics from the paragraph indicating that crocodiles are precocial. (2)
(6)

2.6 The diagram below shows different responses during 'fight or flight' reactions in the human body.



2.6.1 Identify:

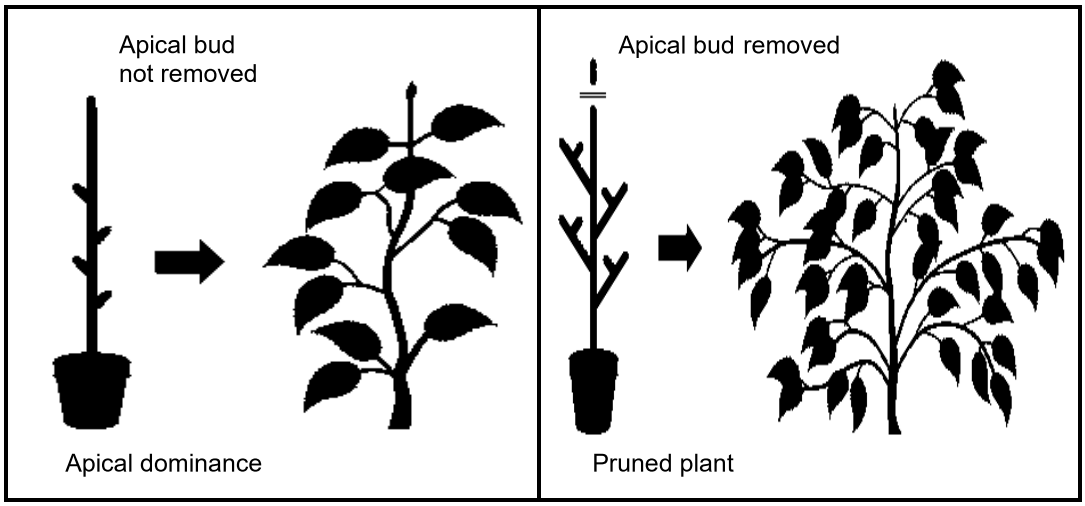
(a) Gland **A** (1)

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

(c) Effect **C** (1)

2.6.2 Explain the effect of higher levels of hormone **B** on the heartbeat. (4)
(7)

2.7 The diagram below represents apical dominance in a plant. The plant has been pruned (apical bud removed). Both plants are of the same species and produce fruits.



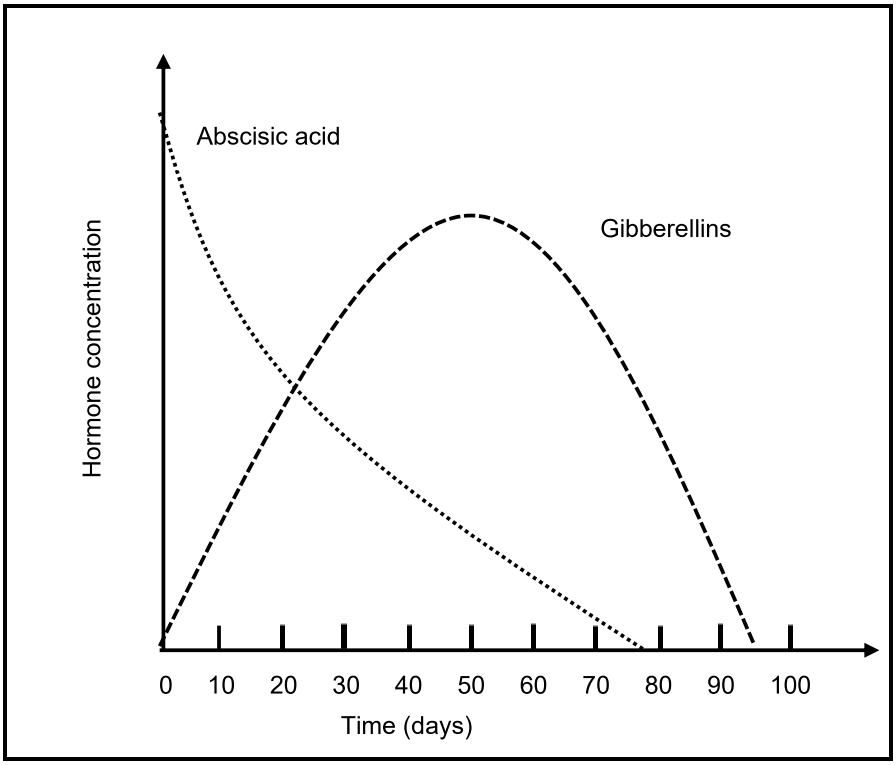
2.7.1 Name the hormone responsible for apical dominance. (1)

2.7.2 Explain the economic benefits to a farmer by pruning trees that produce fruit. (3)
(4)
[50]

QUESTION 3

3.1 Starch stored in seeds is converted to glucose by enzymes at the beginning of germination. Gibberellins, which are synthesised by the seed embryo, trigger the production of these enzymes. Abscisic acid in the seed inhibits the production of gibberellins.

The graph below shows the relationship between gibberellins and abscisic acid over 50 days.



3.1.1 Which of the hormones in the graph promotes plant growth? (1)

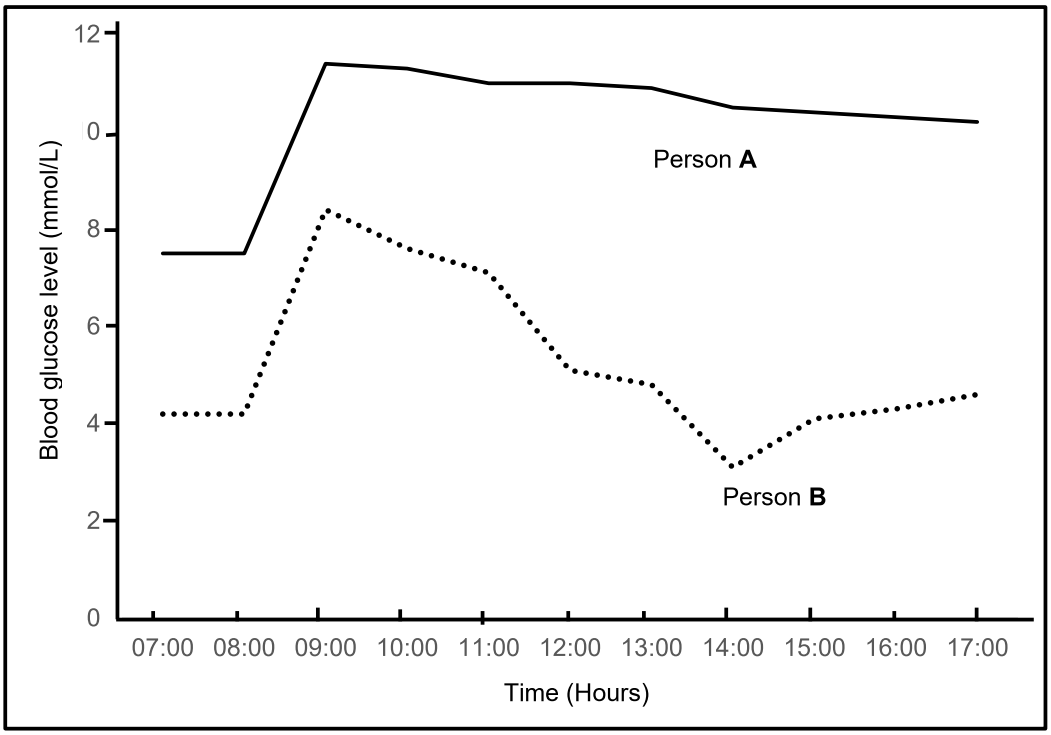
3.1.2 How would the high abscisic acid levels influence the level of gibberellins? (2)

3.1.3 Explain why starch must be broken down to glucose during the germination process. (2)
(5)

3.2 The graph below shows the blood glucose level in a person with diabetes mellitus and a healthy person without diabetes mellitus. Both ingested 100 ml of glucose solution. In a healthy person it takes 5 hours for blood glucose level to return to normal levels.

The blood glucose levels in a healthy person, when not eating is between 3,9 and 7,1 mmol/L of blood.

The graph below shows the blood glucose levels in a healthy person and a person with diabetes mellitus after the glucose intake.



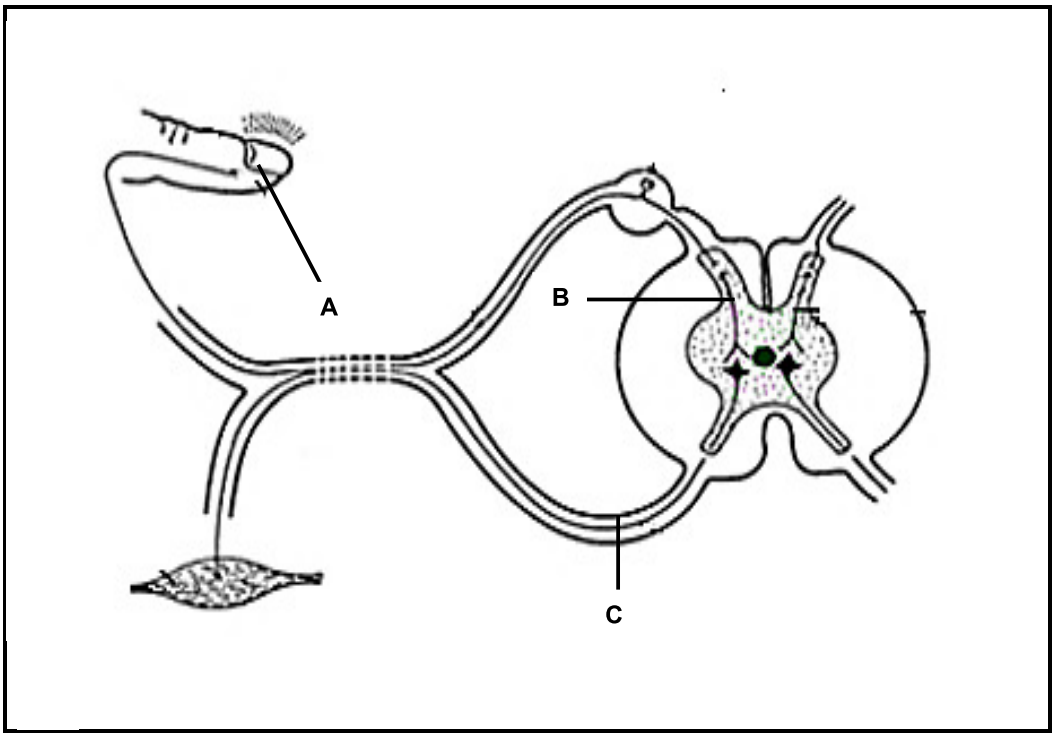
3.2.1 Which person, **A** or **B,** is suffering from diabetes mellitus? (1)

3.2.2 Give TWO reasons for your answer in QUESTION 3.2.1. (2)

3.2.3 Explain the change in blood glucose levels in a healthy person after 09:00. (4)
(7)

3.3 Describe the negative feedback mechanism involving high blood carbon dioxide levels. **(5)**

3.4 The diagram below shows a pathway of a nerve impulse during a reflex action.



3.4.1 Name the pathway represented by the diagram above. (1)

3.4.2 Identify part **B**. (1)

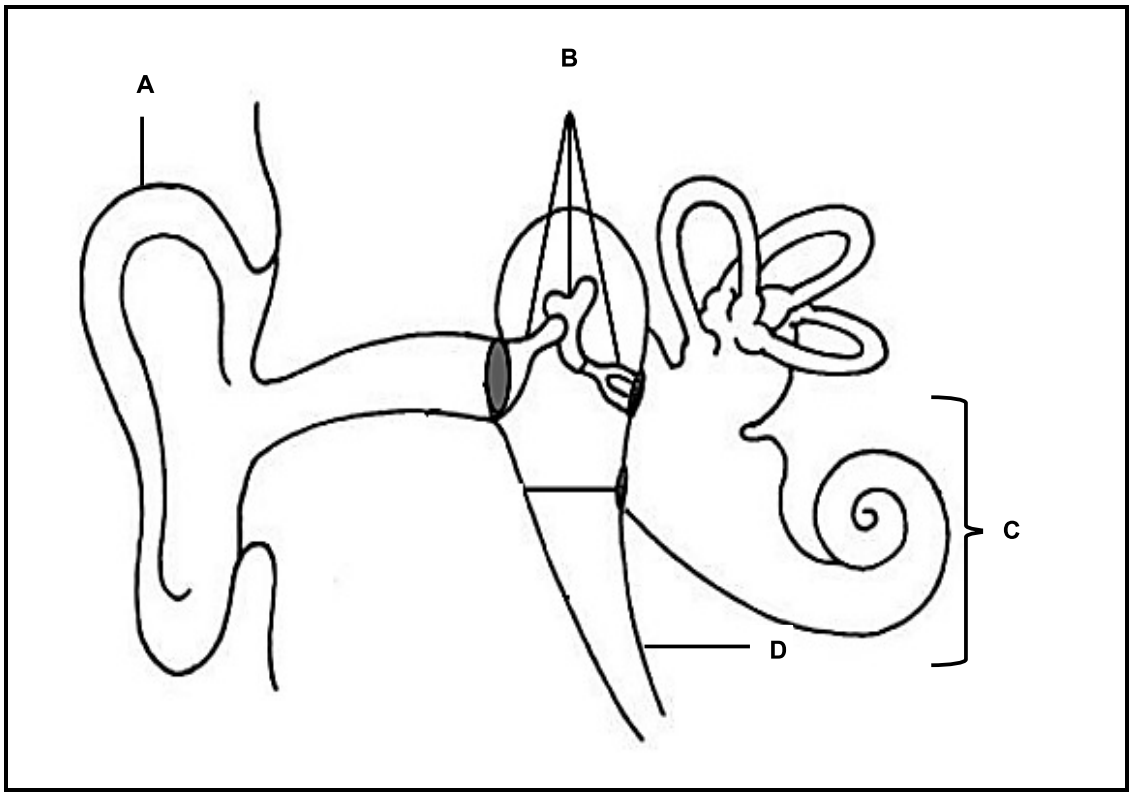
3.4.3 Give the function of part **A**. (1)

3.4.4 What is the significance of reflex actions? (1)

3.4.5 Explain the effect on the reflex action if the myelin sheath of part **C** were damaged. (3)
(7)

3.5 Describe the autonomic nervous system. **(4)**

3.6 The diagram below represents the human ear.



3.6.1 Identify:

(a) Part **C** (1)

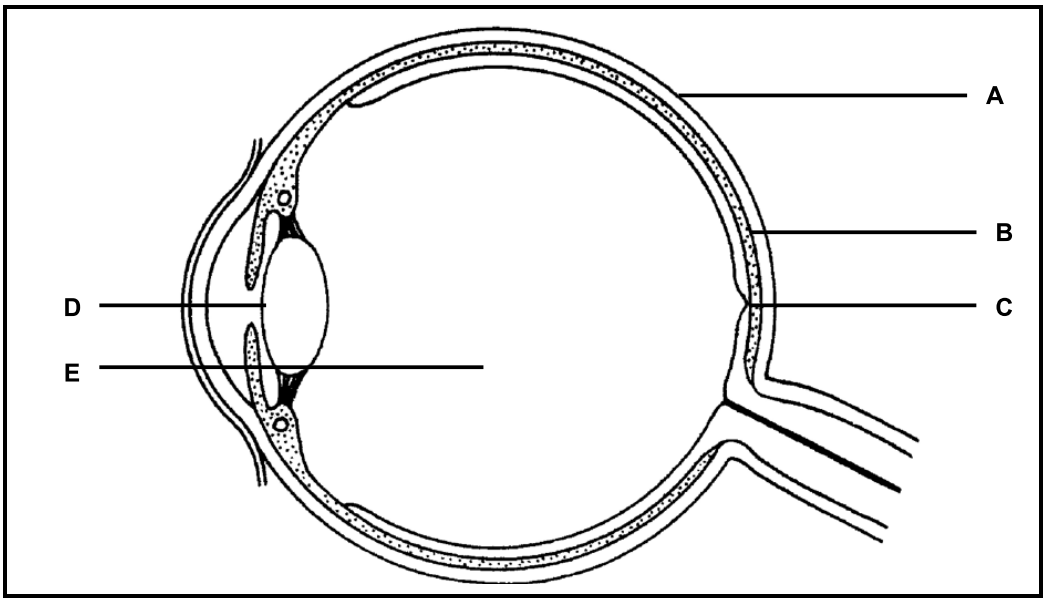
(b) The function of part **A** (1)

3.6.2 Explain the role that part **D** plays in ensuring hearing. (3)

3.6.3 Otosclerosis is a hearing disorder which happens when the three bones in part **B** fuse together.

Describe how otosclerosis affects hearing. (4)
(9)

3.7 The diagram below shows the human eye.



3.7.1 Identify part **A**. (1)

3.7.2 Give the LETTER of the part that contains many blood vessels to provide nourishment to the eye. (1)

3.7.3 Name the part of the eye that has a high number of cones. (1)

3.7.4 Give the function of the liquid found in **E**. (1)

3.7.5 Explain TWO ways part **D** is structurally adapted to perform its function. (4)

3.7.6 Describe how an eye defect that forms a cloudy layer on part **D** affects the ability to see. (5)
(13)
[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150