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**NATIONAL SENIOR
CERTIFICATE**

GRADE 12

LIFE SCIENCES PAPER 1

PREPARATORY EXAMINATION

SEPTEMBER 2024

MARKS: 150

DURATION: 2½ HOURS

This question paper consists of 13 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 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 to D) next to the question numbers (1.1.1 to 1.1.9) in the ANSWER BOOK, e.g. 1.1.10 D .
- 1.1.1 Which ONE of the following occurs when an apical bud from a rose bush is regularly removed? The rose bush will...
- A. remain the same size.
 - B. grow taller.
 - C. produce more lateral branches.
 - D. produce more flowers.
- 1.1.2 A function of the cerebrum is to...
- A. regulate appetite.
 - B. inhibit voluntary movements.
 - C. control higher thought processes.
 - D. control muscle tone and balance.
- 1.1.3 Which of the following parts of the brain co-ordinates voluntary movements?
- A. Cerebellum
 - B. Spinal cord
 - C. Cell body
 - D. Meninges
- 1.1.4 The tough, non-elastic tissue that covers the outer part of the eyeball is the...
- A. sclera.
 - B. conjunctiva.
 - C. choroid.
 - D. retina.
- 1.1.5 The amniotic fluid that surrounds the developing embryo of a human helps to...
- A. transport oxygen to the developing embryo.
 - B. transport carbon dioxide to the developing embryo.
 - C. protect the embryo against mechanical injury.
 - D. transport nitrogenous waste substances to the developing embryo.

QUESTIONS 1.1.6 AND 1.1.7 REFER TO THE INVESTIGATION BELOW.

A scientist did an investigation to determine the effect of drinking water on urine production.

A healthy athlete was requested not to drink water or eat food for five hours before the investigation started. The investigation was conducted over a period of three days.

The following procedure was followed.

- Day 1, the athlete was given 500ml of water to drink.
- Day 2, the athlete was given 700ml of water to drink.
- Day 3, the athlete was given 900ml of water to drink.
- On each day of the investigation, the amount of urine produced by the athlete was measured and recorded over a four hour period after drinking the water.
- The average was calculated.

1.1.6 Which ONE of the following CORRECTLY indicates the dependent and independent variable?

	Independent variable	Dependent variable
A	The amount of urine produced	Time in hours
B	The amount of water consumed	The amount of urine produced
C	The amount of urine produced	The amount of water consumed
D	The person participating	Time in hours

1.1.7 The list below shows the planning steps before and after the investigation.

- (i) Permission was obtained from the athlete.
- (ii) The measuring tool was decided upon.
- (iii) The amount of water was measured.
- (iv) The duration of the investigation was decided upon.

Which of the planning steps above are correct?

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

1.1.8 Which ONE of the following is a function of gibberellins?

- A. Slows down the germination of seeds.
- B. Stimulate the germination of seeds.
- C. Promotes the ageing of leaves.
- D. Brings about tropism.

- 1.1.9 Which ONE of the following is a characteristic of external fertilisation?
- A. The embryo is protected inside the body of the female.
 - B. Copulation takes place.
 - C. A large number of ova are produced.
 - D. Sperm is introduced into the body of the female.
- (9 x2) (18)

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 1.2.10) in the ANSWER BOOK.

- 1.2.1 A process where an embryo attaches itself into the endometrium.
- 1.2.2 The division of the nervous system that is made up of the cranial and spinal nerves.
- 1.2.3 A hormone that stimulates the mammary glands to produce milk.
- 1.2.4 The outer membrane that encloses the **foetus** in the **uterus** of a human.
- 1.2.5 The structure that connects the left and **right hemispheres** of the cerebrum.
- 1.2.6 The blood vessel in the umbilical cord that transports nutrients to the foetus.
- 1.2.7 A disorder of the nervous system caused by the breakdown of the myelin sheath of neurons.
- 1.2.8 The open passage through which sound waves travel to the middle ear.
- 1.2.9 The external physical structures used by plants that prevents herbivores from feeding on them.
- 1.2.10 A behavioural pattern of animals feeding their young and protecting them from predators.

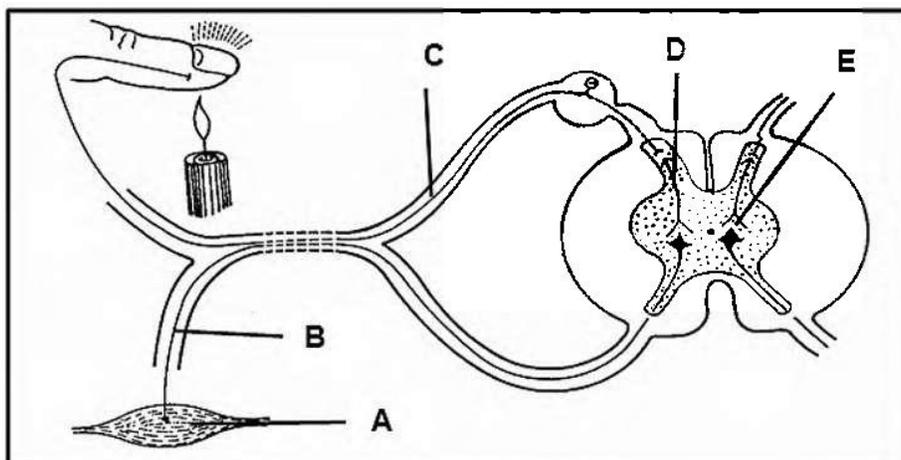
(10 x 1) (10)

- 1.3 Indicate whether each of the descriptions in COLUMN I apply 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. A hormone that stimulates the secretion of the hormone of the thyroid gland	A: Testosterone B: Abscisic acid
1.3.2. A part of the ear that absorbs sound waves from the inner ear	A: Round window B: Pinna
1.3.3. A gland that has ducts to transport its secretions to where they are needed	A: Endocrine gland B: Exocrine gland

(3x2) (6)

- 1.4 The diagram below represents a part of the human central nervous system.



- 1.4.1 Identify part:

- (a) **A** (1)
- (b) **D** (1)
- (c) Microscopic gap at **E** (1)

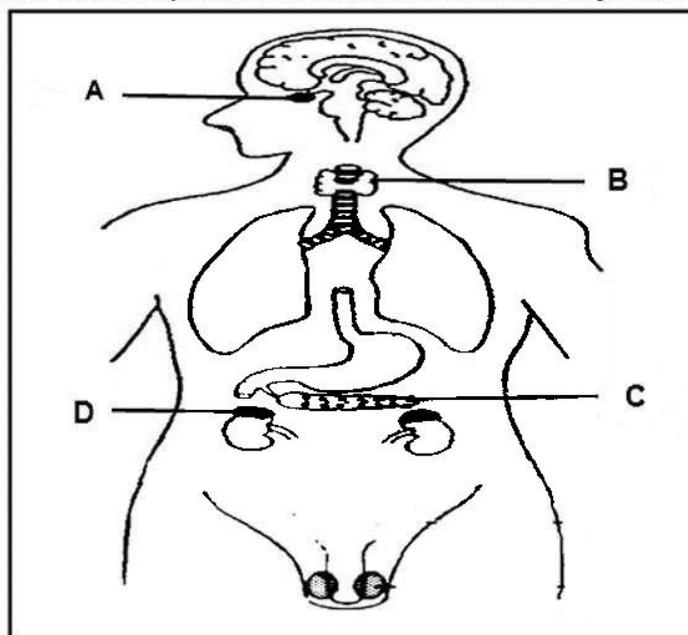
- 1.4.2 Give the LETTER and NAME of the part which is probably damaged if a person...

- (a) can walk, but cannot detect any stimulus. (2)
- (b) can feel the stimulus, but cannot respond. (2)

1.4.3 Write down in the **correct order** the LETTERS ONLY of the path taken by a nerve impulse until a response takes place. (2)

1.4.4 Give the name of the process which enables a person to quickly and involuntarily respond to a stimulus. (1)
(10)

1.5 The diagram below represents the human endocrine system.



1.5.1 Identify gland:

(a) **C** (1)

(b) **D** (1)

1.5.2 Give the name of the hormone that...

(a) Is involved in the reabsorption of salts in the renal tubules of the kidneys. (1)

(b) Controls the growth of long bones. (1)

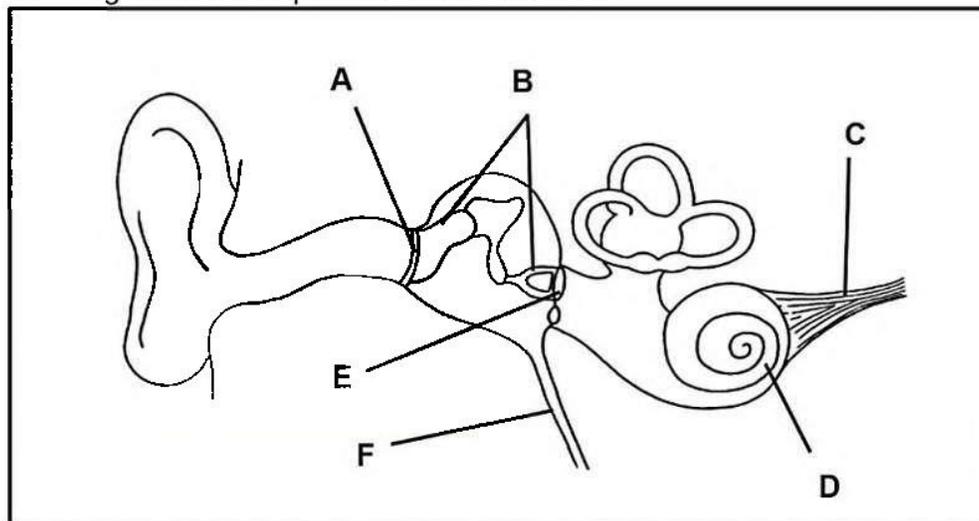
1.5.3 Name the disease that results when gland **C** is unable to produce the hormone insulin. (1)

1.5.4 Name the type of interaction that occurs between the hormones secreted by glands **A** and **B**. (1)
(6)

TOTAL QUESTION 1: 50
TOTAL SECTION A: [50]

SECTION B**QUESTION 2**

2.1 The diagram below represents the human ear.



2.1.1 Identify part:

- (a) **C** (1)
- (b) **D** (1)
- (c) **E** (1)

2.1.2 State ONE function of part **F**. (1)

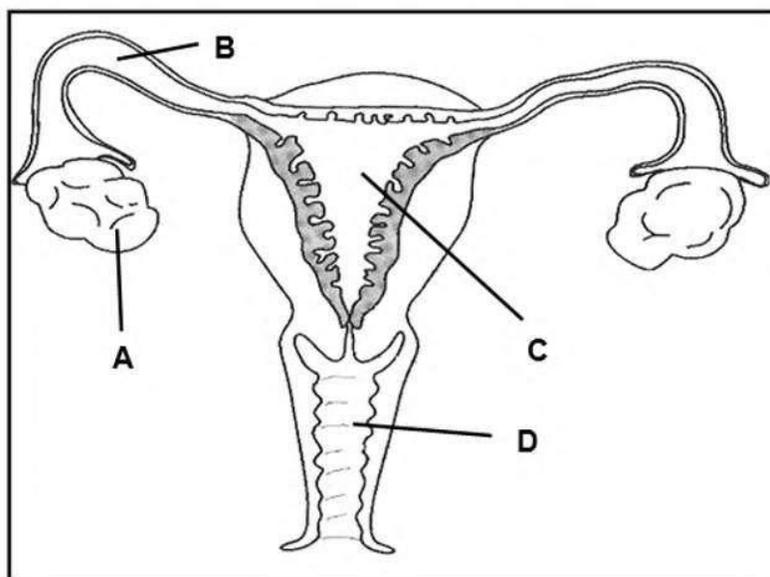
2.1.3 Middle ear infection is a common cause for loss of hearing.
Name ONE way in which middle ear infection can be treated. (1)

2.1.4 Describe how part **A**, **B** and **E** assists in amplifying sound. (4)

2.1.5 Describe how the semi-circular canals play a role in maintaining balance when the body changes speed and direction. (5)

(14)

2.2 The diagram below represents the female reproductive system.



2.2.1 Give the LETTER and NAME of the part where:

(a) Fertilisation takes place. (2)

(b) The embryo develops. (2)

2.2.2 State TWO functions of part **D**. (2)

2.2.3 Name and describe the type of gametogenesis that takes place in part **A**. (5)

2.3 Draw a labelled diagram to show the structure of a haploid cell that will fuse with a haploid cell produced in part **A**. (11)

2.4 The table below indicates the growth of a human foetus six months after fertilisation has taken place. (5)

Months after fertilisation	1	2	3	4	5	6
Length of foetus (cm)	0,5	4	7,5	15	25	30

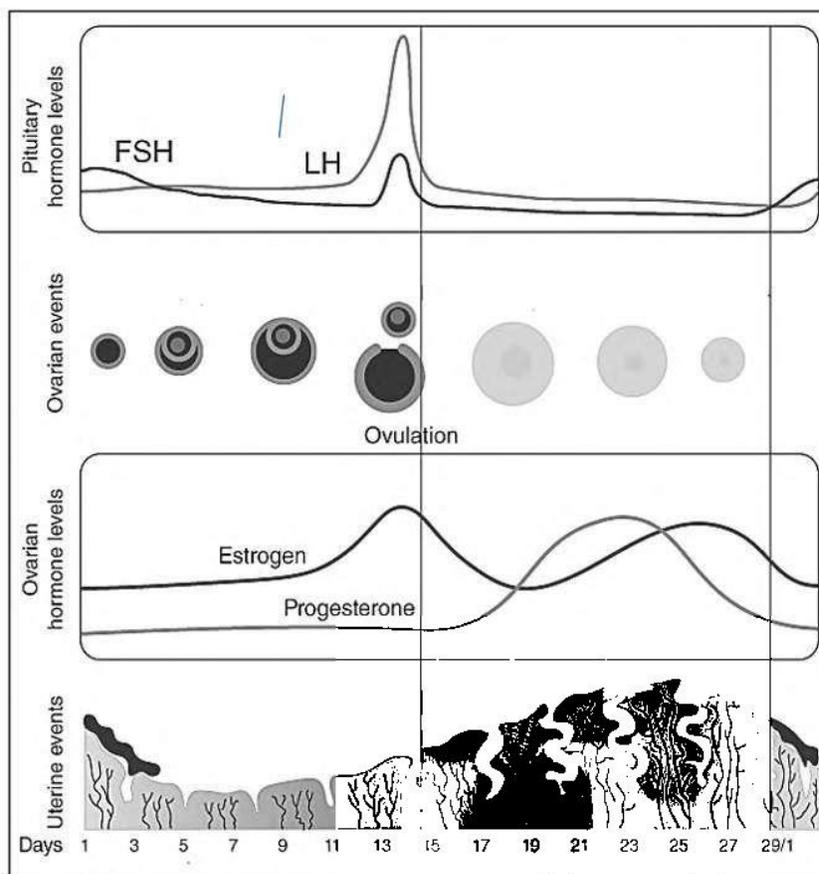
2.4.1 Between which two consecutive months did foetal growth double? (1)

2.4.2 What is the percentage increase in foetus length between the 3rd and 6th month after fertilization? Show ALL working. (3)

2.4.3 Draw a line graph to represent the data in the table. (6)

(10)

- 2.5 The graph below represents a menstrual cycle and the influence of the different hormones on it.



- 2.5.1 On which day does ovulation take place? (1)
- 2.5.2 Between which days does menstruation take place? (1)
- 2.5.3 State ONE function of LH other than ovulation. (1)
- 2.5.4 Describe the functional relationship between progesterone and FSH. (2)
- 2.5.5 Account for the change in the thickness of the endometrial lining between day 14 and day 21. (2)
- 2.5.6 Did fertilisation take place in the 28-day cycle illustrated in the graph? (1)
- 2.5.7 Explain your ANSWER to question 2.5.6. (2)
- (10)**

TOTAL QUESTION 2: 50

QUESTION 3

- 3.1 The table below shows a comparison of the composition of the amniotic egg in different bird species.

COMPOSITION	BIRD SPECIES		
	1	2	3
Yolk (%)	30	38	18
Water content in yolk (%)	79	59	57
Energy (kcal/g)	1,16	1,46	1,03

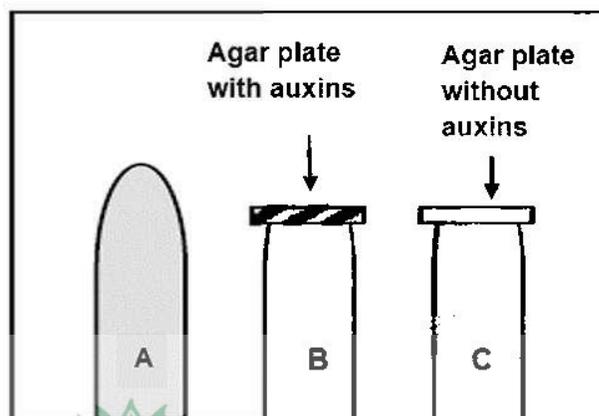
- 3.1.1 Define ovovivipary (2)
- 3.1.2 Which ONE of the bird species (1, 2 or 3) shows altricial development as a reproductive strategy? (1)
- 3.1.3 Explain your answer to QUESTION 3.1.2. (2)
- (5)**
- 3.2 Dale did an investigation to determine the effect of auxins on the growth of three plant shoots (**A**, **B** and **C**). The plant shoots were treated as follows:

- Shoot **A** – Tip of the shoot was not removed
- Shoot **B** – Tip removed and an agar plate with auxins placed on top
- Shoot **C** – Tip removed and agar plate without auxins placed on top

(Agar is a jelly-like substance that allows auxins to diffuse through it)

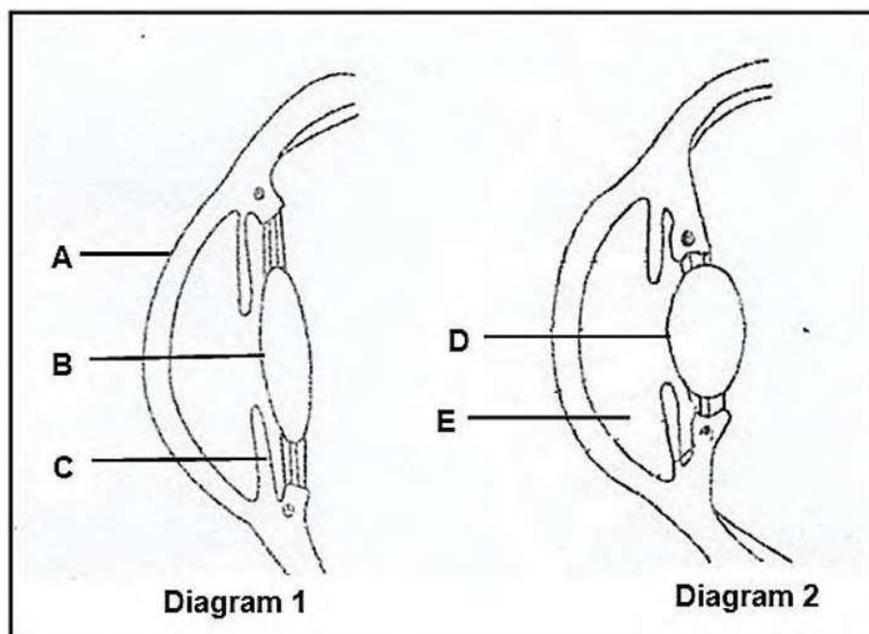
All shoots were exposed to the same light conditions.

The diagram below indicates the set-up at the beginning of the investigation.



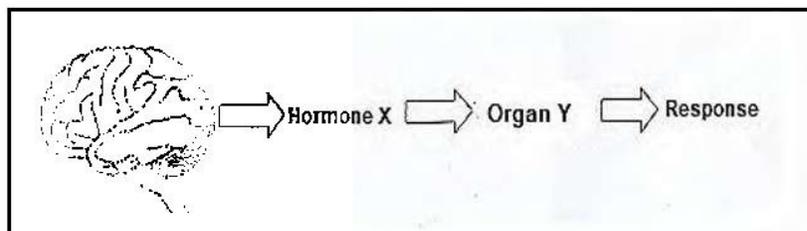
- 3.2.1 Explain the results as observed in:
- (a) Shoot **B** after a few days (2)
- (b) Shoot **C** after a few days (2)
- 3.2.2 State TWO factors that must be kept constant in this investigation. (2)
- 3.2.3 State TWO ways in which Dale could have improved the reliability of her investigation. (2)
- (8)**

3.3 The diagrams below show parts of the human eye



- 3.3.1 Give the LETTER and NAME of the part that regulates the amount of light that enters the eye. (2)
- 3.3.2 Name and describe the process that the part named in QUESTION 3.3.1 will undergo when exposed to bright light. (5)
- 3.3.3 Explain how part **A** is structurally suited to perform its function. (2)
- 3.3.4 State TWO functions of the liquid in part **E**. (2)
- 3.3.5 Which diagram (**1** or **2**) is adapted to distant vision? (1)
- 3.3.6 Give a reason for your answer to question 3.3.5. (1)
- 3.3.7 Describe how the changes in the lens from **diagram 1** to **diagram 2** are brought about. (5)
- (18)**

- 3.4 The diagram below represents a homeostatic response that occurs when a person is dehydrated. The decrease in blood volume, as a result of the excessive loss of water, is detected by the brain



- 3.4.1 Define the term homeostasis. (2)
- 3.4.2 Identify:
- (a) Hormone X. (1)
- (b) Target organ Y. (1)
- (4)
- 3.5 Describe what happens when the Carbon dioxide level in the blood increases above normal. (5)
- 3.6 Read the passage below

Sphiwe was walking alone in the bush. She suddenly saw a big snake and she was very frightened. She screamed asking for help, turned around and ran away. During that time, she was breathing heavily and her eyes were wide open.



- 3.6.1 Name the hormone that prepared the body to evade the danger. (1)
- 3.6.2 State the role of the liver during an emergency. (1)
- 3.6.3 Explain the effects of the hormone mentioned in question 3.6.1 on the blood vessels of skeletal muscles. (4)
- (6)
- 3.7 Explain how the thyroid gland is functionally related to body temperature on a cold day. (4)

TOTAL QUESTION 3: 50
 TOTAL SECTION B: 100
 GRAND TOTAL: 150