KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

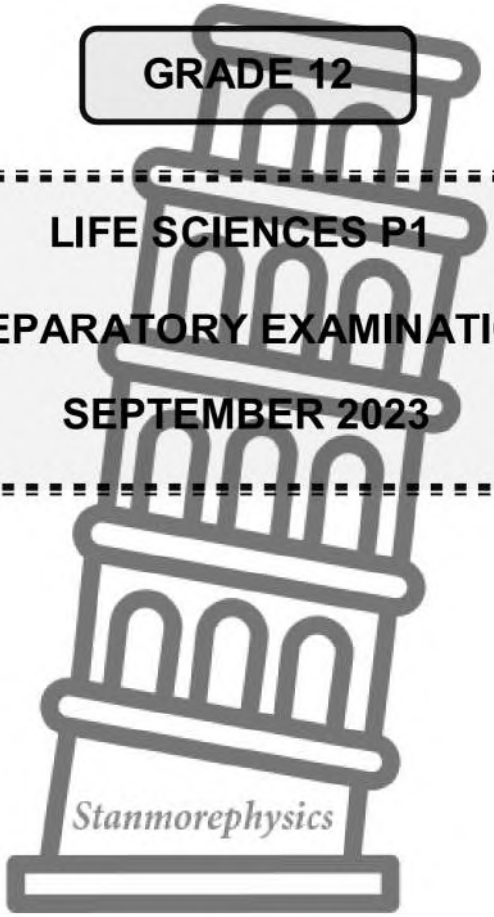
NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P1

PREPARATORY EXAMINATION

SEPTEMBER 2023



MARKS: 150

TIME: 2½ hours

N.B. This question paper consists of 15 pages including this page.

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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. 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, protractor and a 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 correct answer and write only the letter (A to D) next to the question number (1.1.1 to 1.1.9) in your ANSWER BOOK, for example 1.1. 10 D.

1.1.1 Which ONE of the following hormones controls metabolic rate?

A Testosterone
B Thyroxin
C Growth hormone
D Insulin

1.1.2 Which ONE of the following is both an exocrine and endocrine gland?

A Pituitary
B Pancreas
C Adrenal
D Thyroid

1.1.3 Which ONE of the following disorders is characterised by memory loss and confusion?

A Alzheimer's disease.
B Haemophilia.
C Multiple sclerosis.
D Down syndrome.

1.1.4 A worker spent ten minutes in a walk-in freezer. Below are some of the changes that occurred in his body in response to the drop in external temperature.

(i) Blood vessels in the skin constrict
(ii) Brain reacts
(iii) Skin temperature increases
(iv) Temperature receptors in the skin detect changes

Which ONE is the correct sequence in which the changes occurred?

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

1.1.5 In a reflex arc, impulses leave the spinal cord via a …

A motor neuron through the ventral root of the spinal nerve.
B motor neuron through the dorsal root of the spinal nerve.
C sensory neuron through the ventral root of the spinal nerve.
D sensory neuron through the dorsal root of the spinal nerve.

QUESTIONS 1.1.6 AND 1.1.7 ARE BASED ON THE FOLLOWING INVESTIGATION

A group of Grade 12 learners investigated the influence of different concentrations of auxins on radicle growth. A radicle is a young root that grows from a seed.

The procedure was as follows:

- 100 bean seeds were germinated.
- The seedlings were then divided into five groups (in five petri dishes) of twenty seedlings each.
- Each of these five petri dishes was placed in a beaker containing a different concentration of auxins.
- All five beakers were placed inside a dark cupboard for three days.
- After three days the increase in the length of each radicle was measured.
- The average increase in length of the radicle in each beaker was calculated and recorded in the table below.

BEAKER NUMBER	AUXIN CONCENTRATION IN PARTS PER MILLION (ppm)	AVERAGE INCREASE IN RADICLE LENGTH (mm)
1	0,1	4,8
2	1	3,2
3	10	2,3
4	50	1,5
5	80	0,5

1.1.6 Which ONE of the following increases the reliability of the results?

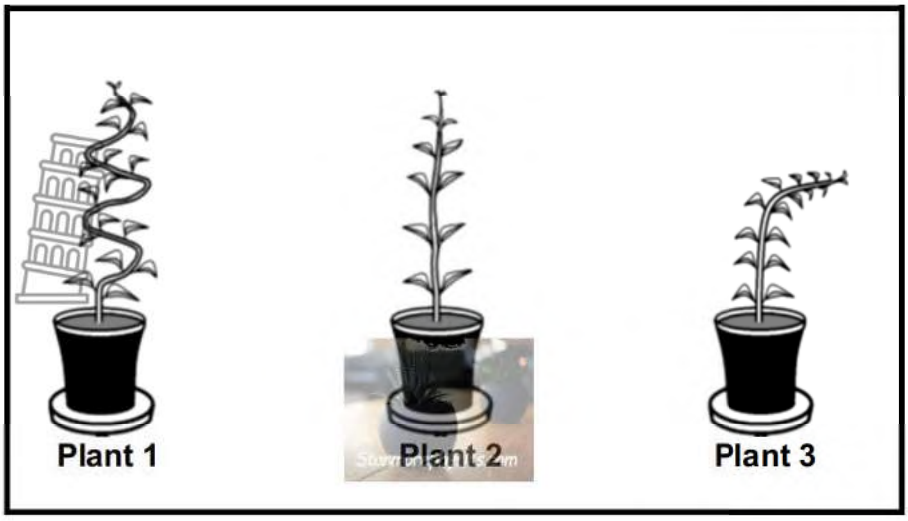
A All five beakers were placed inside a dark cupboard for three days
B Different auxin concentrations were used
C After three days the increase in the length of each radicle was measured.
D The results of 100 bean seeds were calculated

1.1.7 Which ONE of the following is the correct conclusion that can be made from the results in the table?

A A higher auxin concentration causes increased growth of the radicle.
B An higher auxin concentration causes decreased growth of the radicle.
C The auxin concentration has no effect on the radicle growth.
D A lower auxin concentration causes decreased growth of the radicle.

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QUESTIONS 1.1.8 AND 1.1.9 ARE BASED ON THE FOLLOWING DIAGRAMS.



1.1.8 Which ONE of the following represents the plant/s exposed to uniform light?

A Plant **1** only
B Plant **1** and Plant **2**
C Plant **2** only
D Plant **1** and Plant **3**

1.1.9 Which ONE of the following explanations is correct regarding Plant **3**?

A It was exposed to light from all sides causing cell elongation equally around the stem
B It was exposed to unilateral light causing cell elongation equally around the stem.
C It was exposed to unilateral light causing more cell elongation on the bright side.
D It was exposed to unilateral light causing more cell elongation on the dark side.

(9 x 2) **(18)**

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 to 1.2.9) in the ANSWER BOOK.

1.2.1 Receptors in the inner ear that provide information about the position of the head

1.2.2 A plant hormone that inhibits the germination of seeds

1.2.3 The microscopic gap between two consecutive neurons

1.2.4 The growth movement of a plant in response to a stimulus

1.2.5 Inhibition of the growth of lateral buds by the presence of auxins in apical buds

1.2.6 A quick automatic response to a stimulus involving only the spinal cord

1.2.7 Receptors found in the retina of the eye which are sensitive to bright light

1.2.8 The control centre for temperature regulation in the brain

1.2.9 The increase in the diameter of blood vessels in the skin.

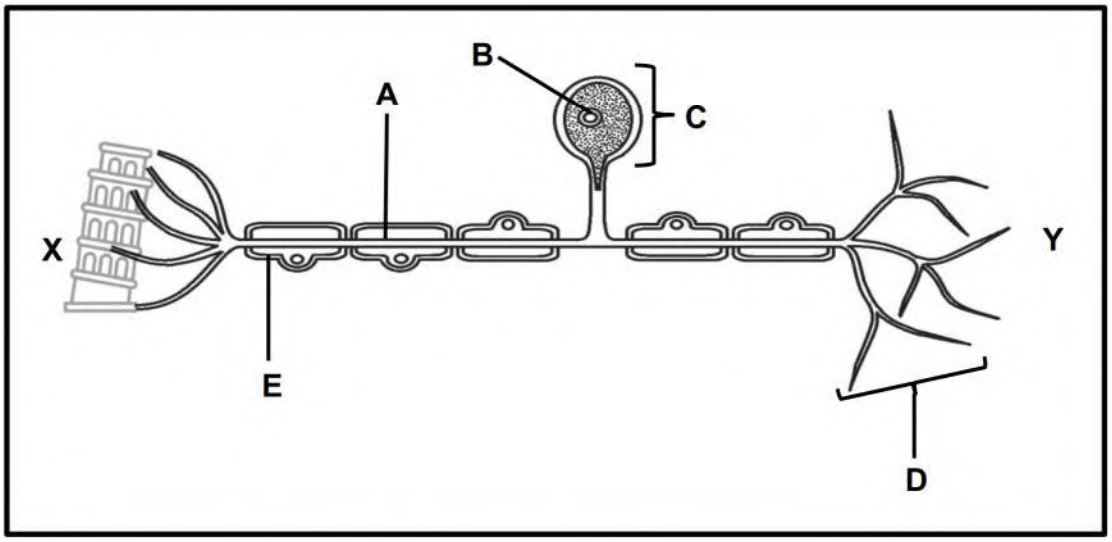
(9)

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 number (1.3.1 to 1.3.3) in the ANSWER BOOK.

	COLUMN I		COLUMN II
1.3.1	Plant hormone that promotes seed dormancy	A: B:	Gibberellins Auxin
1.3.2	Hormone/s secreted by the pituitary gland	A: B:	Prolactin Growth hormone
1.3.3	A branch of the nervous system responsible for voluntary actions	A: B:	Somatic nervous system Peripheral nervous system

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

1.4 The diagram below shows a type of neuron



1.4.1 Identify the type of neuron shown. (1)

1.4.2 Identify part:

(a) **B** (1)

(b) **C** (1)

(c) **D** (1)

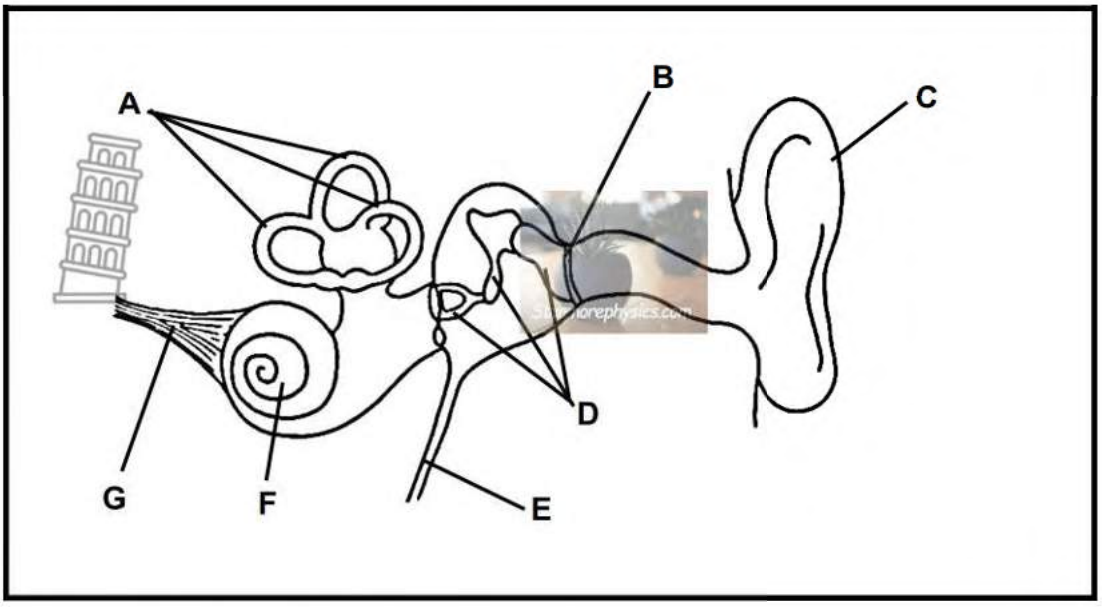
1.4.3 Give ONE function of part:

(a) **A** (1)

(b) **E** (1)

1.4.4 State whether the impulse travels from **X** to **Y** or from **Y** to **X**. (1)
(7)

1.5 The diagram below shows a human ear.



1.5.1 Identify part:

(a) **A** (1)

(b) **D** (1)

(c) **G** (1)

1.5.2 Name the small device that is used in the treatment of middle-ear infection. (1)

1.5.3 Give the LETTER of the part where the small device, named in QUESTION 1.5.2, is inserted. (1)

1.5.4 State the function of part:

(a) **E** (1)

(b) **C** (1)

1.5.5 Name the receptors found at the base of structure **A**. (1)

1.5.6 Give the LETTER and the NAME of the part that is most likely damaged if the pressure waves are not converted into impulses. (2)

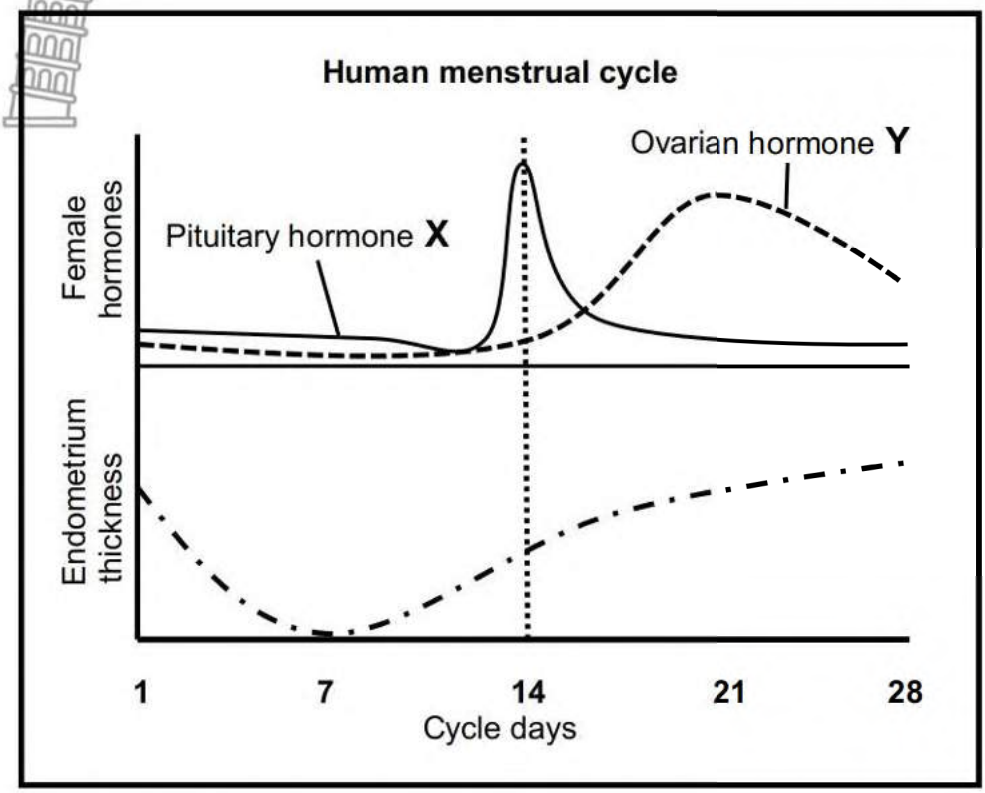
(10)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The diagram below shows the changes in the hormone levels during the female menstrual cycle.



2.1.1 Identify:

(a) Pituitary hormone **X** (1)

(b) Ovarian hormone **Y** (1)

2.1.2 Name the hormone responsible for thickening of the endometrium before day 14. (1)

2.1.3 Explain the effect on reproduction if a female is unable to produce hormone **X**. (3)

2.1.4 Explain the evidence from the graph which suggests that fertilisation did not take place. (3)
(9)

2.2 The diagram and the graph below relate to the control of salt levels in the body.

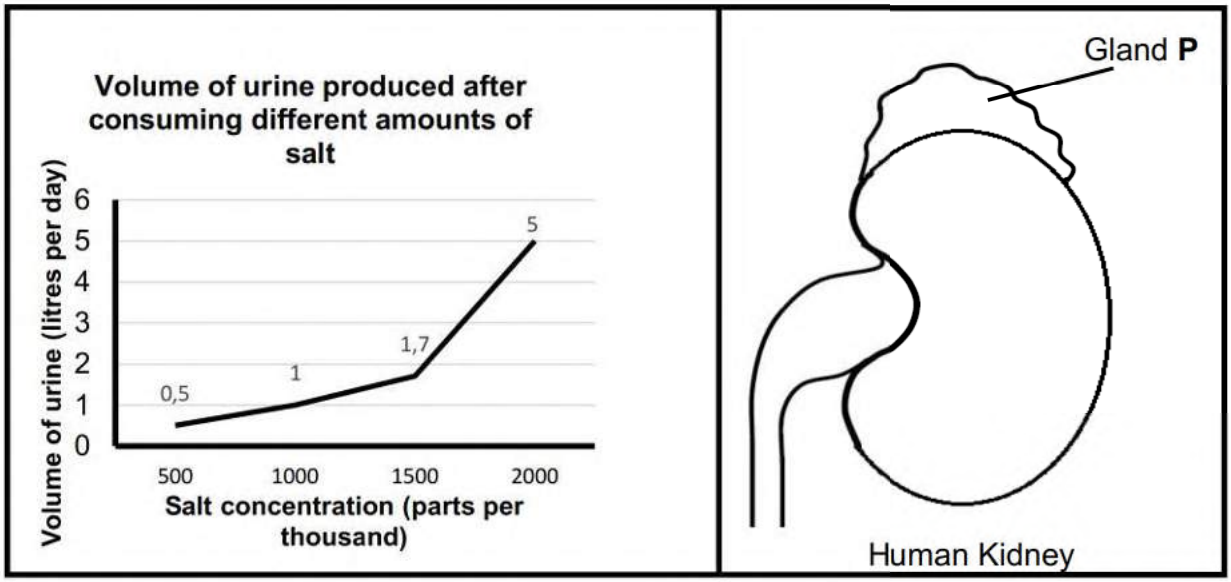
An investigation was conducted to determine the relationship between the amount of salt consumed and the volume of urine produced
The graph and diagram below refer to the control of salt concentration in the human body.

The following procedure was followed:

- One man participated in the investigation
- He was given the same volume of salt solution to drink every day for four days
- He drank the solution daily at 7H00
- Each day the amount of salt consumed was increased by adding more salt to the same volume of water
- The volume of urine produced by the participant was measured daily

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The results are shown in the graph below.



2.2.1 Identify gland **P**. (1)

2.2.2 Name the hormone produced by gland **P**:

(a) which controls salt concentration in the blood. (1)

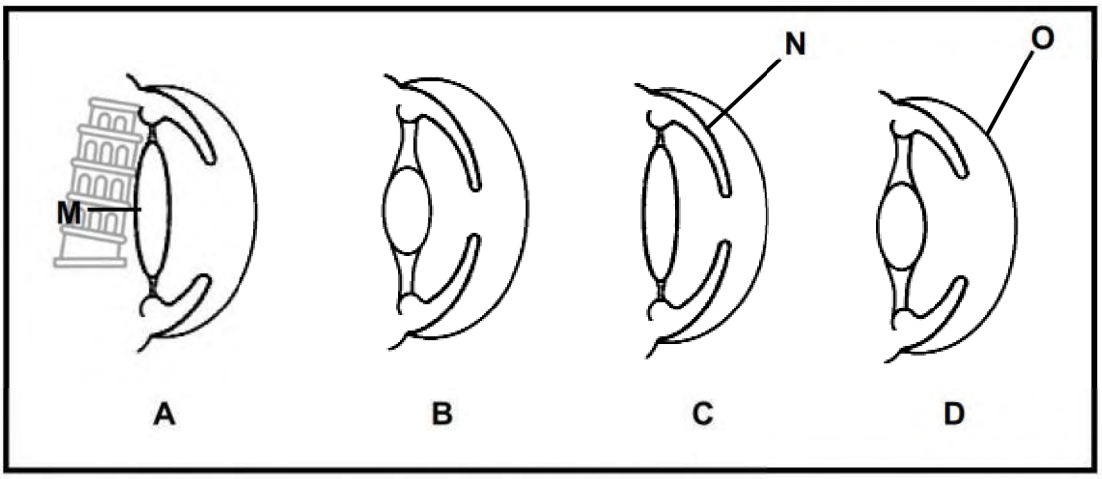
(b) that prepares the body for emergency. (1)

2.2.3 Calculate the percentage increase in the volume of urine between 500 and 1000 parts per thousand. (3)

2.2.4 Explain the results of this investigation as represented by the graph (5)

2.2.5 Explain how the results on the graph would be different if gland **P** had an over secretion of the hormone named in QUESTION 2.2.2 (a). (3)
(14)

2.3 The diagrams (**A**, **B**, **C** and **D**) below show part of the eye under different conditions.



2.3.1 Name the process that involves the changes in the curvature of part **M**. (1)

2.3.2 Give the LETTERS of TWO diagrams (**A**, **B**, **C** or **D**) that represent the eye of a person whose part **M** has a high refractive power (will be able to bend the light the most). (2)

2.3.3 Explain the changes that would occur in part **N** if a person was sitting in a well-lit room at night when all the lights suddenly go out. (4)

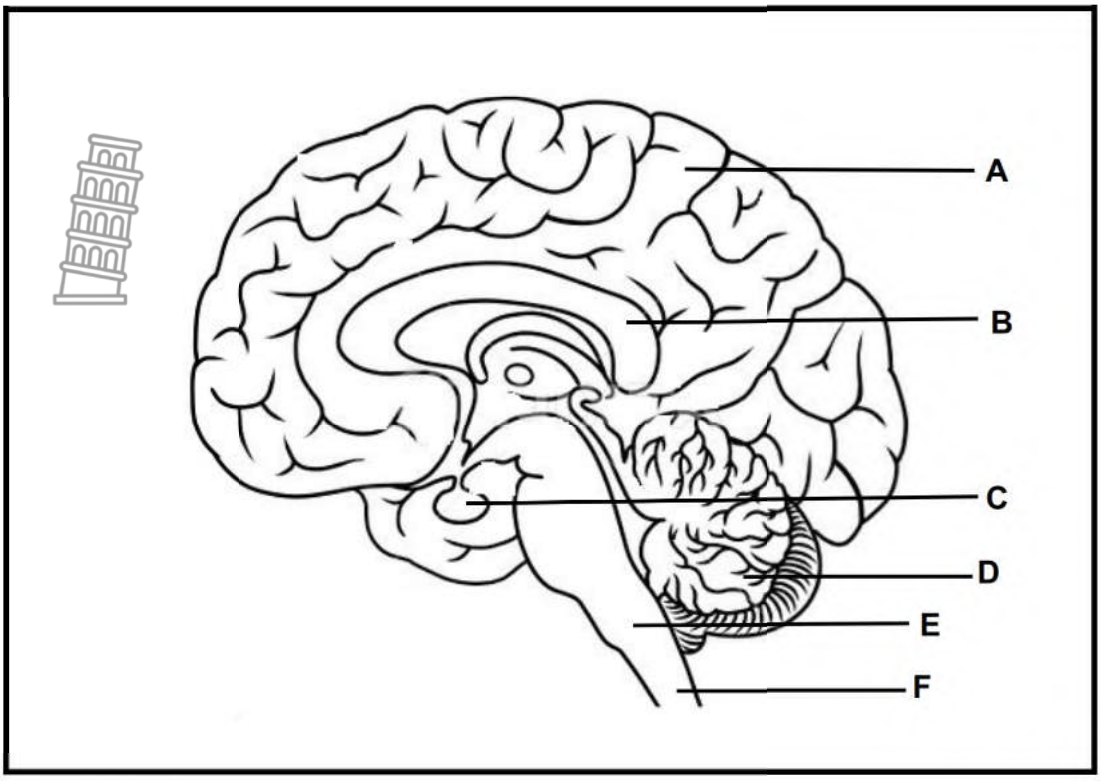
2.3.4 Which diagram (**A**, **B**, **C** or **D**) represents the eye of a person reading a book in a room with bright light? (1)

2.3.5 Name the eye defect that results from the uneven curvature of part **O**. (1)

2.3.6 State ONE way by which the defect named in QUESTION 2.3.5 is corrected. (1)
(10)



2.4 The diagram below shows a human brain.



2.4.1 Identify parts:

(a) **B** (1)

(b) **C** (1)

(c) **F** (1)

2.4.2 State THREE functions of **A**. (3)

2.4.3 Describe the involvement of part **D** in maintaining balance. (3)

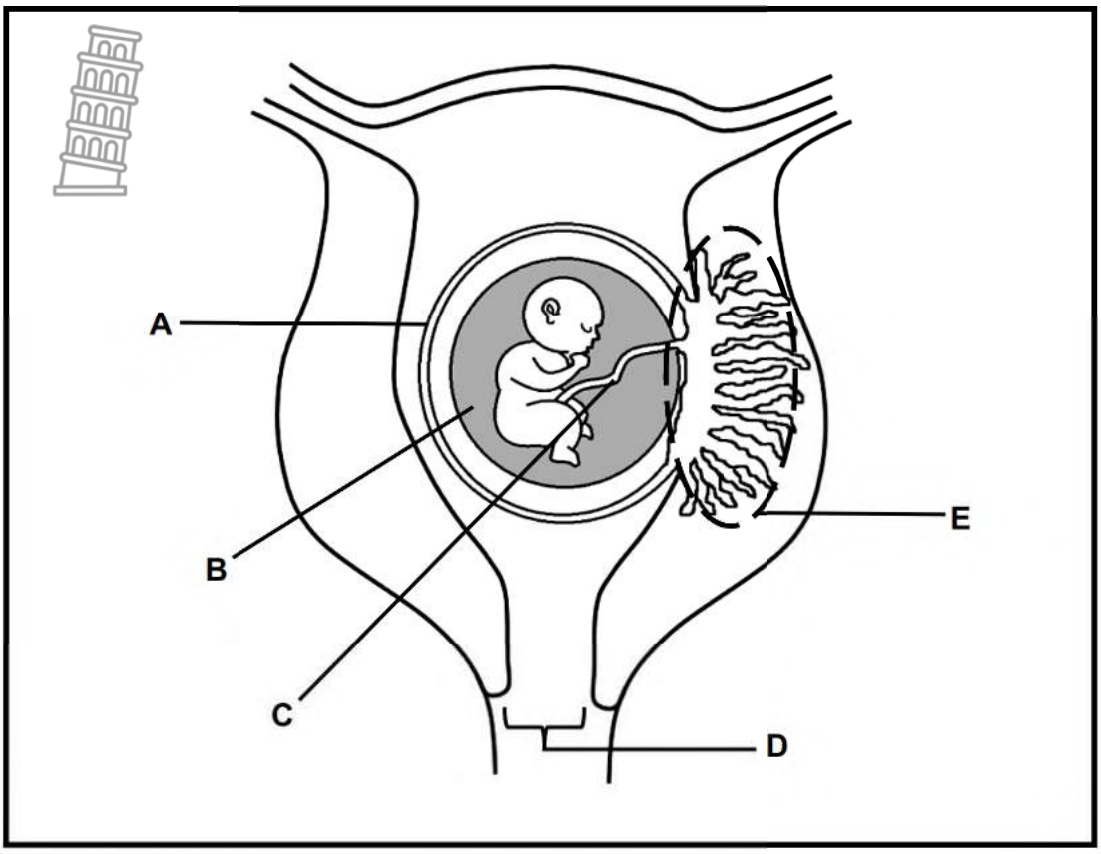
2.4.4 Explain what would happen if part **E** gets damaged. (2)

2.4.5 Describe how the brain is protected from the hard-cranial surface. (1)
(12)

2.5 Describe the functioning of the autonomic nervous system. **(5)**
[50]

QUESTION 3

3.1 The diagram below shows a developing foetus in the female reproductive system.



3.1.1 Identify:

(a) Membrane **A**. (1)

(b) Part **D**. (1)

3.1.2 Give TWO functions of fluid **B**. (2)

3.1.3 Explain how the development of the foetus would be affected if part **C** became completely blocked. (3)

3.1.4 Name TWO systems in a human body whose function is served by region **E** during gestation. (2)

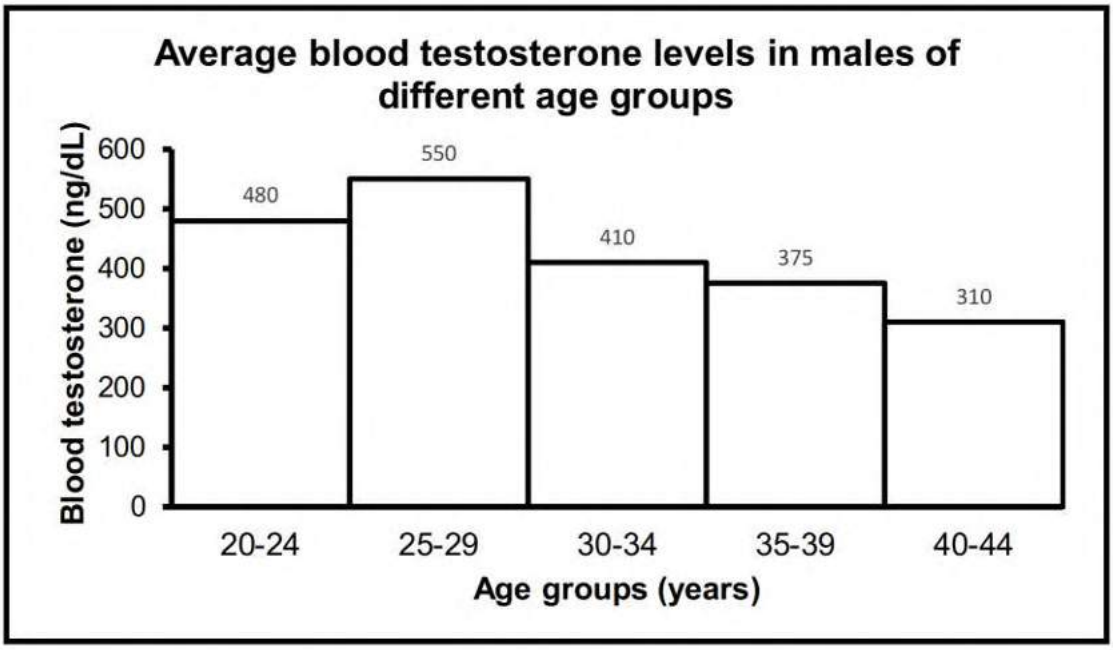
3.1.5 Describe the development of a fertilised ovum until implantation occurs. (5)
(14)

3.2 Describe the process of oogenesis. **(4)**

3.3 A blood test which measures the level of testosterone is often used to determine the cause of infertility in males. An investigation was done to determine the relationship between the age and the level of testosterone (nanograms per decilitre- ng/dL) in human males.

The procedure was as follows:

- 10 000 males were asked to participate in the investigation
- An equal number of males were placed in each age group
- All males were of the same health status
- All males were on the same diet during the investigation
- The blood tests were done every 5 days for 30 days
- The average level of testosterone in the blood was calculated and recorded on the histogram below.



3.3.1 For this investigation, identify the:

(a) Dependent variable (1)

(b) Independent variable (1)

3.3.2 List THREE planning steps for this investigation. (3)

3.3.3 Which age group had the highest blood testosterone levels? (1)

3.3.4 State THREE ways in which the validity of this investigation was increased. (3)

3.3.5 Describe the trend shown by the results on the graph. (2)

3.3.6 Using the evidence from the graph, explain the effect that age would have on reproduction in males. (3)
(14)

3.4 The human body is adapted to control the internal environment and keep its changes within narrow limits.

3.4.1 Describe how the body controls blood glucose levels after a meal. (5)

3.4.2 Name the disorder that results in high level of blood glucose in humans as a symptom. (1)

3.4.3 Describe the effect on the body if a person continuously has high levels of thyroxin in the blood. (3)

3.4.4 Name the gland that produces thyroxin. (1)
(10)

3.5 The passage below refers to reproduction in crocodiles.

Reproduction in crocodiles in the wild

All crocodiles lay hard-shelled fertilised eggs. A female lays an average of 12–48 eggs per nest. The eggs are deposited into the soil, and the sun's heat and heat from the natural decomposition of vegetation maintain a warm temperature that aids the development of the embryo. Until hatching occurs, the female usually remains close to the nest to protect the eggs from predators.

After two or three months, the young are fully developed and ready to hatch. While still in the egg, the young may utter squeaks, perhaps signalling that they are ready to emerge. The adult female removes the dirt or other debris from the eggs and assists the hatchlings to the water. In many cases, the female opens the eggs carefully with her tongue and carries the hatchlings in her mouth. The female remains close to her offspring and provides protection from predators for several weeks to months.

3.5.1 State whether crocodiles have internal or external fertilisation. (1)

3.5.2 Explain TWO ways in which the type of fertilisation, named in QUESTION 3.5.1, increases reproductive success in crocodiles. (4)

3.5.3 Name the type of reproductive strategy in crocodiles which relates to the nourishment and protection of the developing embryo. (1)

3.5.4 Name TWO ways, mentioned in the passage, which indicates that crocodiles have parental care. (2)
(8)

TOTAL SECTION B: 100
GRAND TOTAL: 150

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