education

Department of Education
FREE STATE PROVINCE

PREPARATORY EXAMINATION

GRADE 12



TIME: 2½ HOURS

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. 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 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 numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, for example, 1.1.11 D.

1.1.1 The part of the brain that is responsible for interpreting smell and taste.

A Medulla oblongata
B Hypothalamus
C Cerebellum
D Cerebrum

1.1.2 The site of fertilisation in the female reproductive system.

A Cervix
B Uterus
C Fallopian tube
D Vagina

1.1.3 Which ONE represents the pathway of an impulse?

A Receptor → sensory neuron → interneuron → motor neuron
B Effector → motor neuron → interneuron → sensory neuron
C Receptor → sensory neuron → motor neuron → interneuron
D Sensory neuron → motor neuron → interneuron → effector

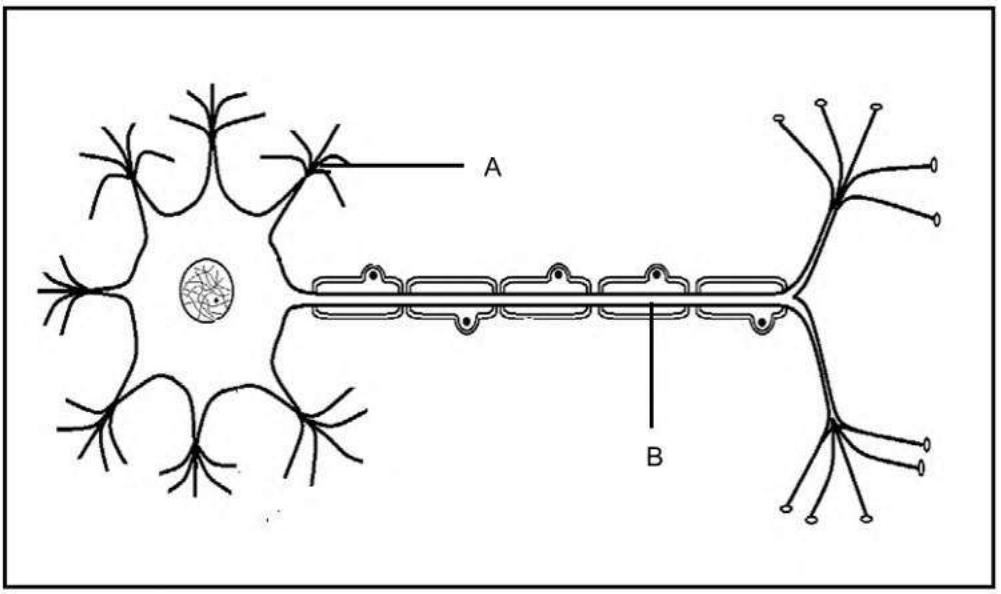
1.1.4 The list below gives the protective components of the central nervous system:

(i) Meninges
(ii) Cerebrospinal fluid
(iii) Cranium
(iv) Vertebral column

Which ONE of the following combinations applies to the protection of the brain?

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

QUESTIONS 1.1.5 AND 1.1.6 ARE BASED ON THE DIAGRAM OF A NEURON.



1.1.5 The diagram represents a …

A motor neuron.
B sensory neuron.
C interneuron.
D connector neuron.

1.1.6 The correct labels for both parts **A** and **B** are ...

	Part A	Part B
A	Dendrites	Axon
B	Axon	Dendrites
C	Dendrites	Myelin sheath
D	Cell body	Dendrites

1.1.7 High levels of progesterone in a female …

A stimulates the pituitary gland to secrete more FSH.
B stimulates the pituitary gland to secrete less FSH.
C inhibits the pituitary gland from secreting more oestrogen.
D stimulates the pituitary gland to secrete less oestrogen.

1.1.8 The pupil of the human eye is covered by the …

A cornea and retina.
B conjunctiva and sclera.
C conjunctiva and cornea.
D retina and sclera.

1.1.9 Which hormone is responsible for female secondary sexual characteristics?

A LH
B Oestrogen
C Progesterone
D Testosterone

1.1.10 Which ONE of the following is CORRECT regarding the events when fertilisation did not occur?

	Corpus luteum	Progesterone level	Menstruation
A	Degenerates	Increases	Occurs
B	Does not degenerate	Decreases	Does not occur
C	Degenerates	Decreases	Occurs
D	Does not degenerate	Increases	Does not occur

(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 The disease is characterised by the degeneration of brain tissue leading to memory loss

1.2.2 The visual defect caused by an irregularly shaped cornea

1.2.3 A small device used to treat middle ear infections

1.2.4 The root that consists of sensory neurons in the spinal cord

1.2.5 Rapid, involuntary response to a stimulus

1.2.6 The type of development in birds where the young are not able to move independently and feed themselves after hatching

1.2.7 The hormone that stimulates the production of milk

1.2.8 The part of the brain that connects the left and right hemispheres of the cerebrum

1.2.9 The structural unit of the nervous system

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

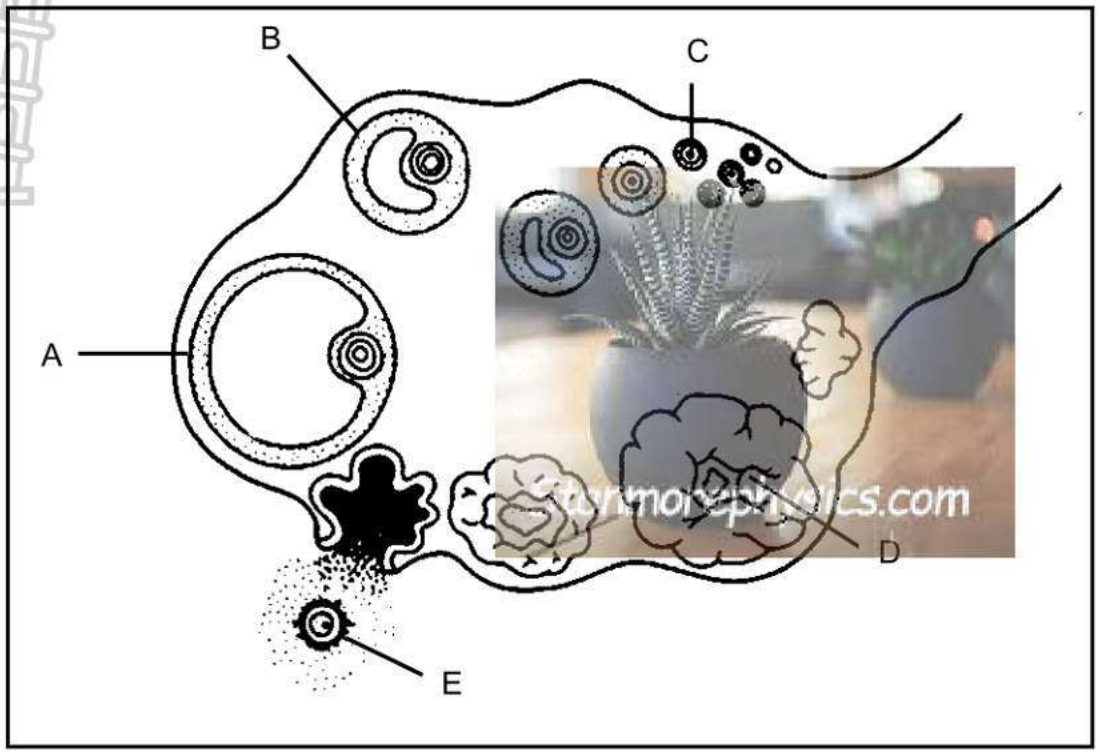
1.3 Indicate whether each of the descriptions in COLUMN I applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **both A and B** or **none** next to the question numbers (1.3.1 to 1.3.3) in the ANSWER BOOK.

COLUMN I		COLUMN II
1.3.1	Affected by a specific hormone	A : Target organ B : Kidney
1.3.2	Responsible for refraction of light	A : Iris B : Vitreous humour
1.3.3	Prepares the body for action	A : Sympathetic nervous system B : Adrenalin

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

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1.4 The diagram below illustrates part of the menstrual cycle in the female body.



1.4.1 Name this cycle of the human menstrual cycle. (1)

1.4.2 Identify:

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

(b) Structure **D** (1)

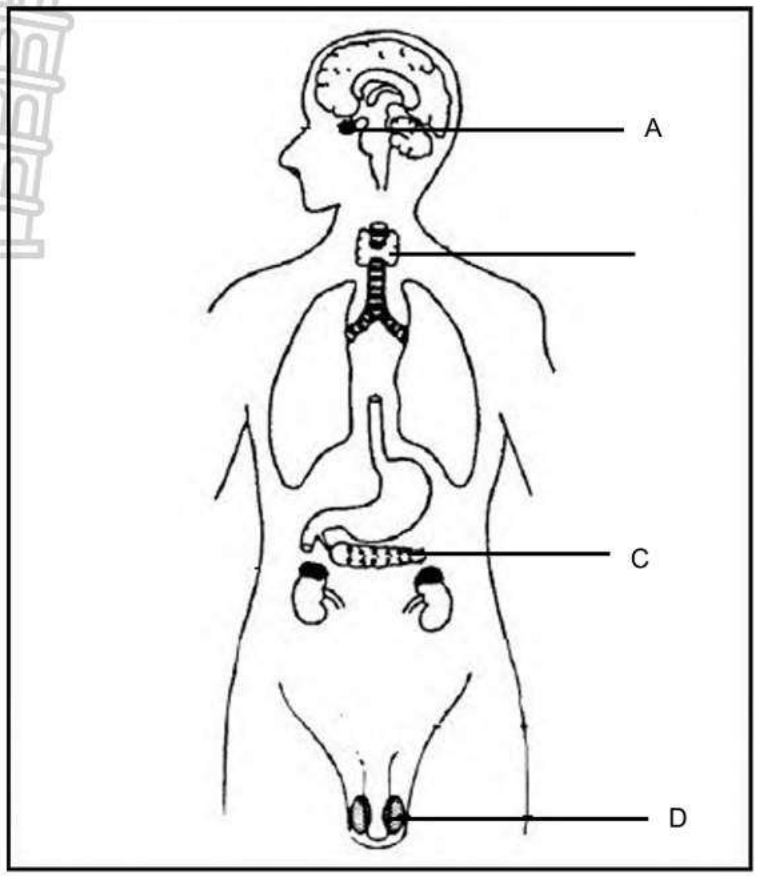
(c) The hormone responsible for the formation of **D** (1)

1.4.3 How many chromosomes are normally found in **E**? (1)

1.4.4 State the type of cell division that takes place to form **C**. (1)

1.4.5 Name the process of releasing cell **E**. (1)
(7)

1.5 The diagram below represents the human endocrine system.



1.5.1 Identify gland **A** (1)

1.5.2 Name a hormone secreted by the gland in QUESTION 1.5.1 that stimulates the growth of a person. (1)

1.5.3 Give the LETTER and the NAME of the gland that secretes a hormone responsible for:

(a Reducing glucose levels in the blood (2)

(b) Initiating puberty in males (2)

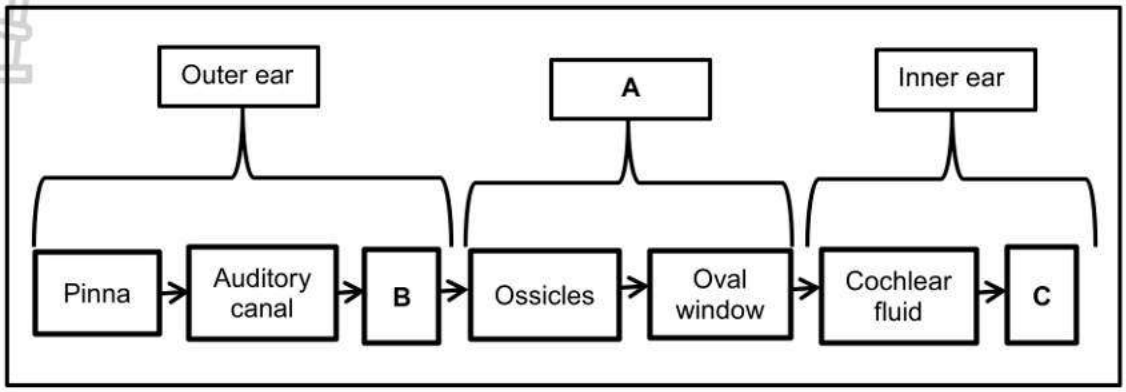
(c) Controlling the metabolic rate (2)
(8)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The diagram below shows the pathway of sound in the ear.



2.1.1 Identify:

(a) Part **A** of the ear (1)

(b) Membrane **B** (1)

(c) Receptor **C** (1)

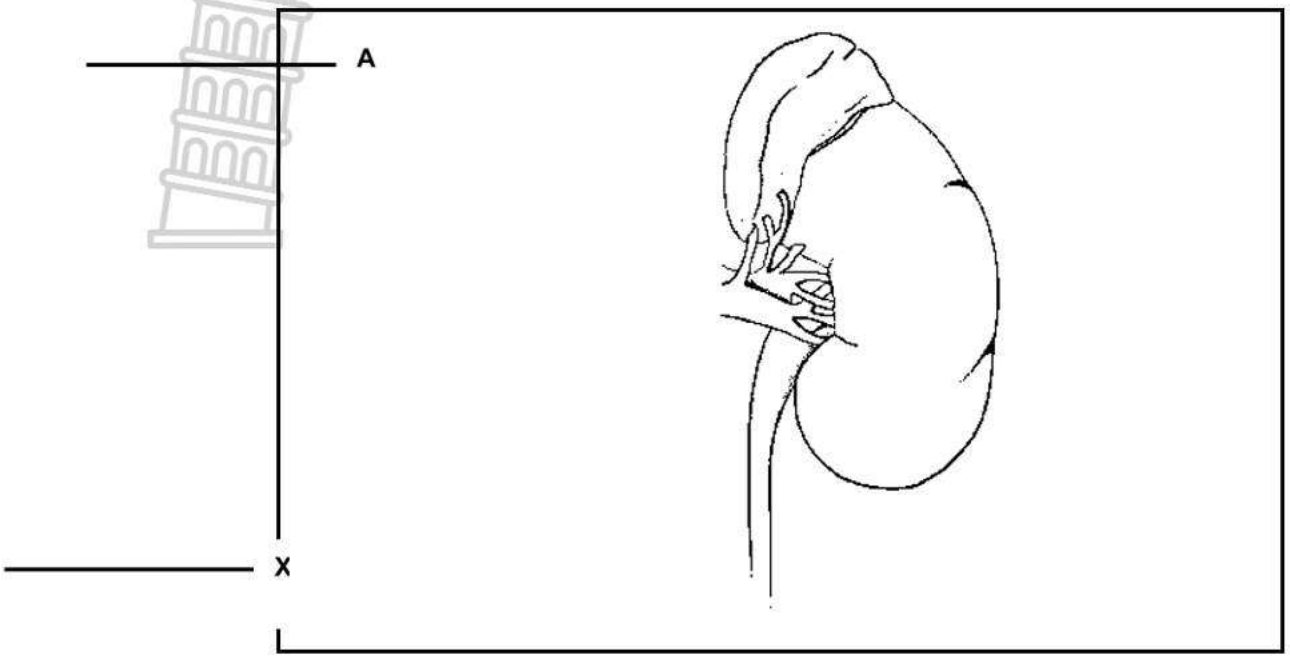
2.1.2 Explain how damage to part **C** could affect hearing. (2)

2.1.3 Describe how infection in **A** may lead to pain in the ear. (3)
(8)

2.2 A defender in a netball game prevented a goal from being scored when she jumped high to catch the ball. As she jumped there was a change in the direction and speed of her head.

Describe how she maintained balance as she jumped to catch the ball. **(6)**

2.3 The diagram shows a kidney, its blood supply and the ureter.



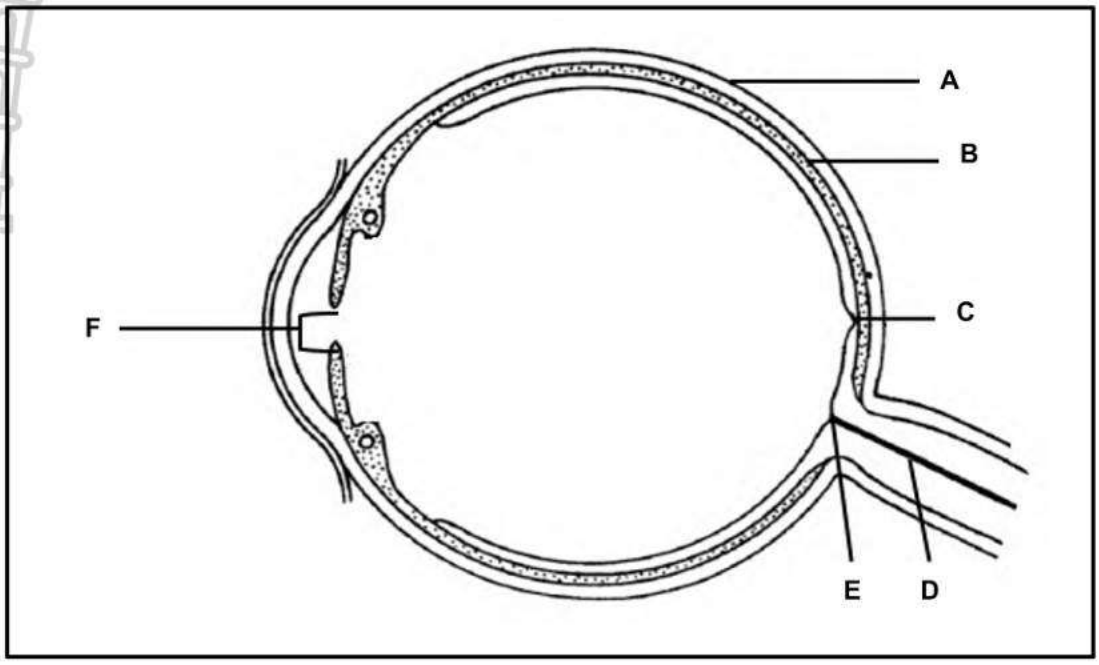
2.3.1 Identify:

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

(b) The hormone secreted by gland **A**, controlling salt balance (1)

2.3.2 Explain what the homeostatic response was when urine is diluted in **X**. (5)
(7)

2.4 The diagram below represents the human eye.



2.4.1 Identify parts:

(a) **A** (1)

(b) **B** (1)

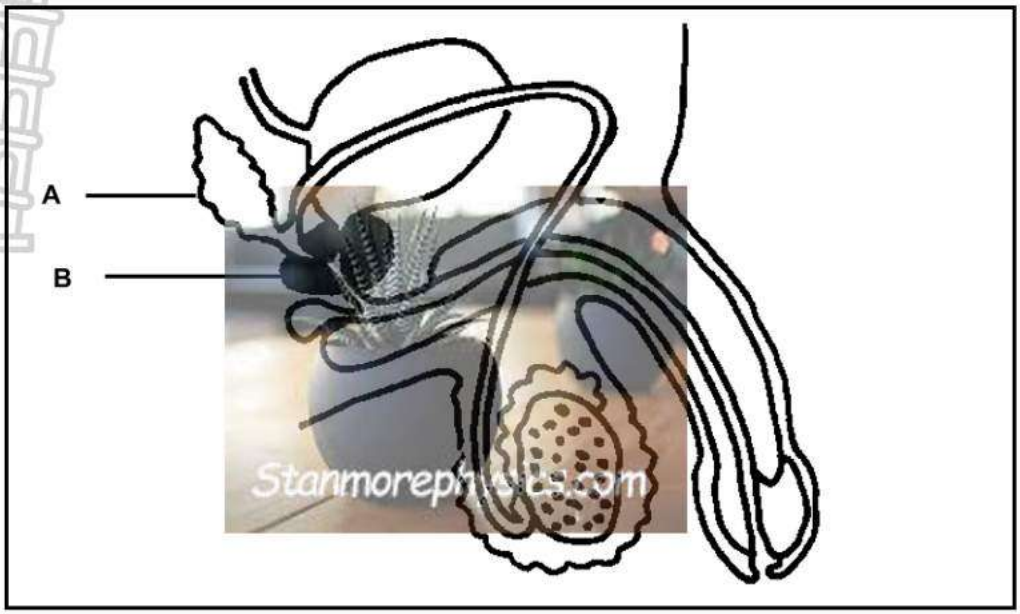
(c) **D** (1)

2.4.2 Describe ONE structural difference between parts **C** and **E**. (2)

2.4.3 Describe how part **F** adjust when a person enters a room with bright lights. (5)

2.4.4 Make a labelled drawing of the parts of the eye that are responsible for accommodation. (4)
(14)

2.5 The diagram below shows the parts of the male reproductive system.



2.5.1 Identify part **A** (1)

2.5.2 Prostate cancer affects men, and the risk increases as men get older, which may lead to surgical removal of part **B**.

Explain how the removal of part **B** may affect male fertility. (3)

2.5.3 Describe the process of spermatogenesis. (4)
(8)

2.6

Scientists at Harvard University investigated to determine which type of underwear leads to low sperm count. They asked 656 men to provide a semen sample and answer a questionnaire about what type of underwear they wore most often in the previous three months. In their results, they found that 75% of men who wore loose-fitting boxer shorts had a higher sperm count, while 25% of men who wore tight underwear had a lower sperm count.

2.6.1 Name the part of the male reproductive system where sperm cells are stored. (1)

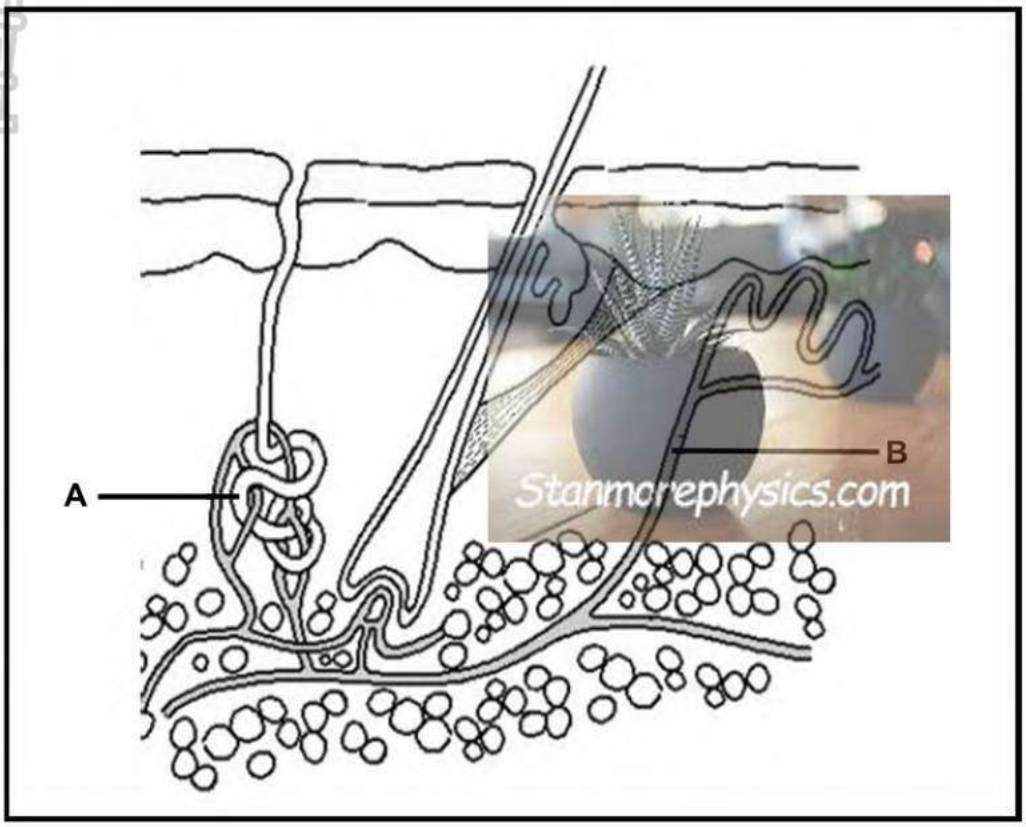
2.6.2 State ONE way in which the results of the investigation can be considered reliable. (1)

2.6.3 Explain why wearing loose-fitting underwear will increase male fertility. (3)

2.6.4 Except for movement, describe ONE way in which the sperm cell is structurally adapted to fertilise an ovum. (2)
(7)
[50]

QUESTION 3

3.1 The diagram below shows parts of a human organ involved in thermoregulation.



3.1.1 Identify the organ represented in the diagram. (1)

3.1.2 Give TWO reasons why part **A** is classified as an exocrine gland. (2)

3.1.3 Describe the role of parts **A** and **B** on a hot day. (5)
(8)

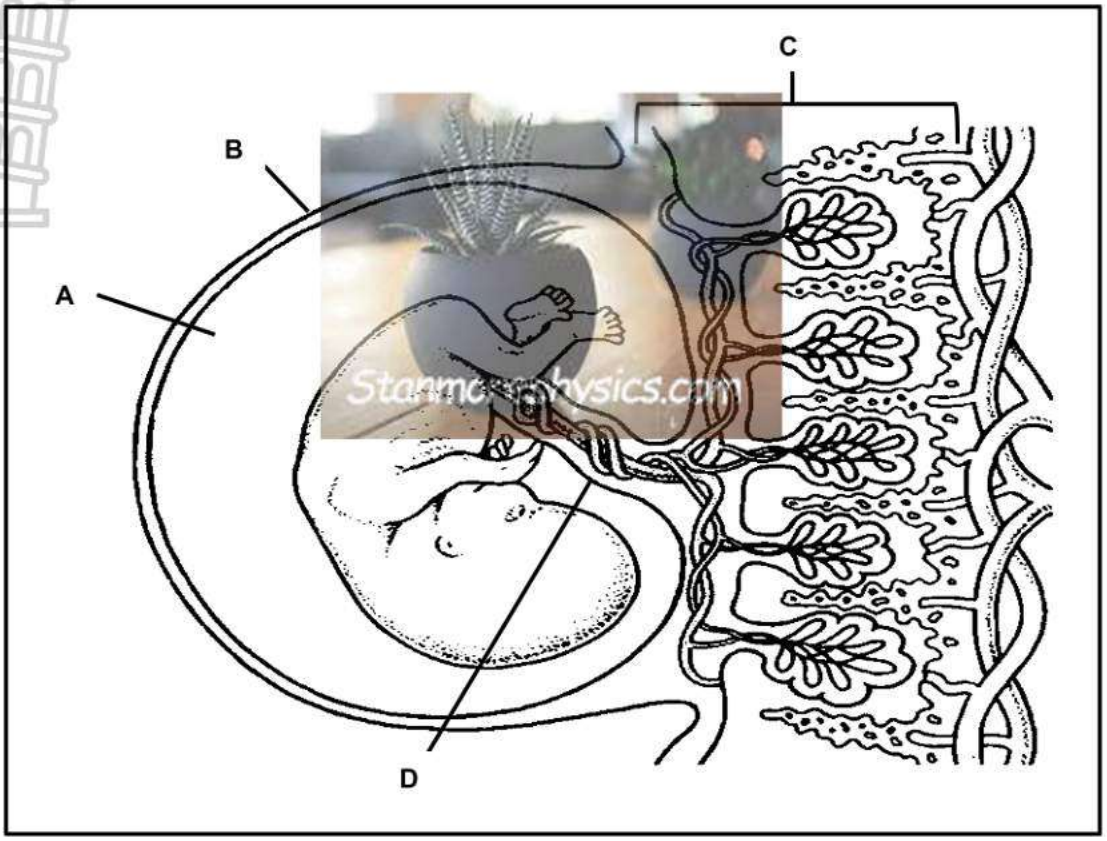
3.2 An investigation was conducted to determine the concentration of carbon dioxide in an individual's carotid artery at different intervals whilst on a treadmill. The results of the investigation are illustrated in the table below.

Duration (minutes)	Carbon dioxide concentration (mmol/ℓ)
0	23
15	24
30	25
45	25
60	23

3.2.1 What were the normal levels of carbon dioxide in the blood of the individual? (1)

3.2.2 Describe the homeostatic control of carbon dioxide in the blood after 45 minutes. (7)
(8)

3.3 The diagram below represents a developing foetus in the uterus.



3.3.1 Identify label **B**. (1)

3.3.2 Name TWO functions of **A**. (2)

3.3.3 Describe how structure **C** is formed. (3)

3.3.4 Explain the endocrine role of part **C** during gestation. (3)

3.3.5 Tabulate TWO differences between the composition of blood found in the blood vessels in part **D**. (5)
(14)

3.4 Read the extract below.

SHARK REPRODUCTION

In Hammerhead, Lemon and Mako sharks the embryo develops inside of the womb and will have a placenta and live birth. Each shark has an umbilical cord that is located between the pectoral fins. The Bamboo sharks and Epaulette sharks lay eggs in a deposit of water. Once the eggs are laid the female leaves without the eggs being protected. The female can lay 200 eggs. In Great white sharks, Nurse sharks and Thresher sharks the egg hatches inside of the womb and the shark has a live birth.

3.4.1 Name ONE ovoviviparous shark. (1)

3.4.2 Explain why Bamboo sharks and Epaulette sharks release large numbers of eggs. (3)

3.4.3 Describe the differences in nutrition of the embryos of the Lemon and Bamboo sharks. (3)
(7)

3.5 Scientists investigated to determine the effect of different concentrations of auxin on the cell elongation of coleoptiles (young stems). The following steps were followed:

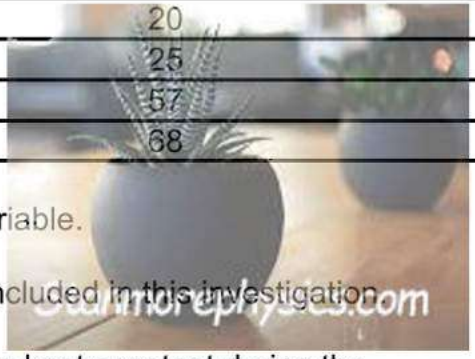
- Fifty (50) coleoptiles from the same species of bean plants were used.
- All the coleoptiles were the same length.
- The tips of the coleoptiles are removed. These coleoptiles were then placed into five groups.
- Each group was injected at the cut surface with a different concentration of auxin.

  - Group **B** was injected with 2 arbitrary units of auxins
  - Group **C** was injected with 4 arbitrary units of auxins
  - Group **D** was injected with 6 arbitrary units of auxins
  - Group **E** was injected with 8 arbitrary units of auxins

- Group **A** was included but was not injected with auxin.
- After four days the length of the coleoptiles in each group was measured and the average was calculated.

Table showing the results of the investigation.

Group	Average increase length of coleoptiles (mm)
A	0
B	20
C	25
D	57
E	68



3.5.1 Identify the independent variable. (1)

3.5.2 Explain why group **A** was included in this investigation. (2)

3.5.3 State TWO factors that were kept constant during the investigation. (2)

3.5.4 State ONE conclusion that can be drawn from the results. (2)

3.5.5 Draw a bar graph to represent the data in the table. (6)

(13)

[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150

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