



GRADE 12

LIFE SCIENCES P1

JUNE 2024

MARKS: 150

TIME: 2½ HOURS

This question paper consists of 18 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, protractor and compass, where necessary.
11. Write neatly and legibly.

SECTION A

QUESTION 1

- 1.1 Various options are given 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 amniotic fluid in the amniotic egg ...

- A removes waste products.
- B provides nutrition to the developing embryo.
- C protects the embryo against mechanical injuries.
- D allows gaseous exchange.

1.1.2 Which pair of statements below best describes oogenesis and spermatogenesis?

| | OOGENESIS | SPERMATOGENESIS |
|---|---|--|
| A | TWO ovums are produced during mitosis | Millions of sperms are produced during mitosis |
| B | Four mature ovums are produced during meiosis | One sperm is produced during meiosis |
| C | One mature ovum is produced during meiosis | Millions of sperms are produced during meiosis |
| D | One ovum is produced during mitosis | Four sperms are produced during meiosis |

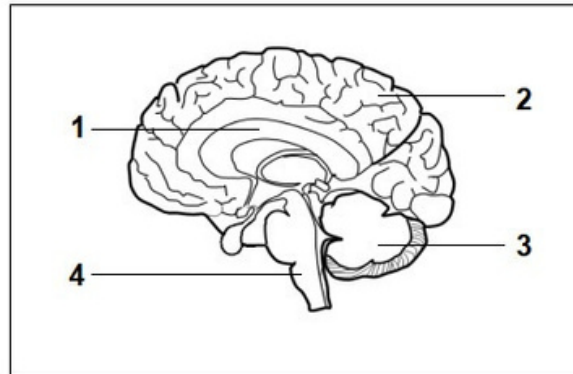
1.1.3 Which ONE of the following photoreceptor cells are responsible for colour vision in human eyes?

- A Cones
- B Rods
- C Fovea
- D Cornea

1.1.4 The normal site of fertilisation in a human female is the ...

- A uterus.
- B ovary.
- C vagina.
- D Fallopian tube.

QUESTIONS 1.1.5 TO 1.1.7 ARE BASED ON THE DIAGRAM WHICH REPRESENTS THE HUMAN BRAIN.



1.1.5 Which ONE of the following represents the corpus callosum?

- A 1
- B 2
- C 3
- D 4

1.1.6 Which ONE of the following represents the cerebellum?

- A 1
- B 2
- C 3
- D 4

1.1.7 Part 2 is responsible for ...

- A coordination and controlling all voluntary actions.
- B controlling the heartbeat.
- C conducting impulses between the two hemispheres of the brain.
- D interpreting impulses from the retina of the eye.

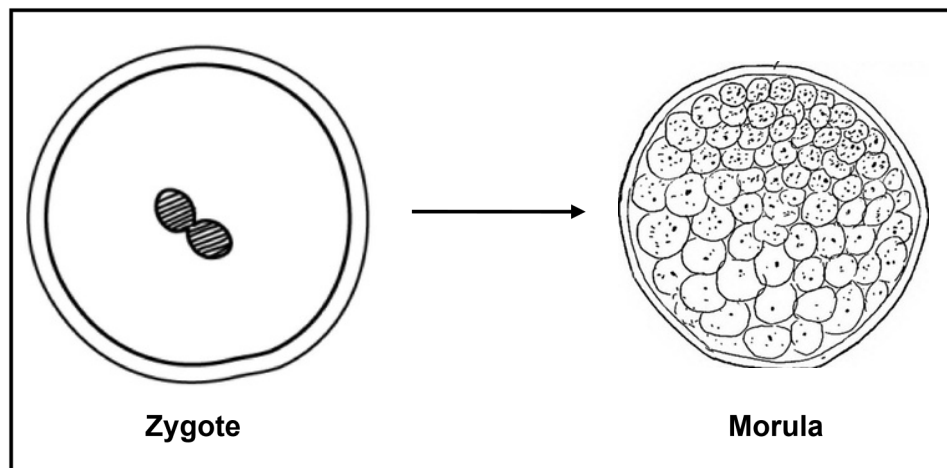
1.1.8 The peripheral nervous system is made up of the ...

- A autonomic nerves and spinal cord.
- B brain and automatic nerves.
- C cranial nerves and the spinal nerves.
- D brain and spinal cord.

1.1.9 Oogenesis takes place in the ...

- A uterus.
- B ovary.
- C Fallopian tube.
- D vagina.

1.1.10 Which term describes the process shown in the diagram below?



- A Fertilisation
- B Mitosis
- C Implantation
- D Meiosis

(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 1.2.7) in the ANSWER BOOK.

1.2.1 A thin, dark pigmented, vascular layer in the eye that provides the cells with oxygen and nutrients

1.2.2 The branch of the autonomic nervous system that slows down the heartrate

1.2.3 The membrane attached to the hammer/malleus

1.2.4 Membranes that surround the brain and the spinal cord

1.2.5 The neck of the uterus

1.2.6 The area of the retina that contains the highest concentration of cones

1.2.7 The structure in the sperm that contains enzymes to dissolve the outer layer of the ovum

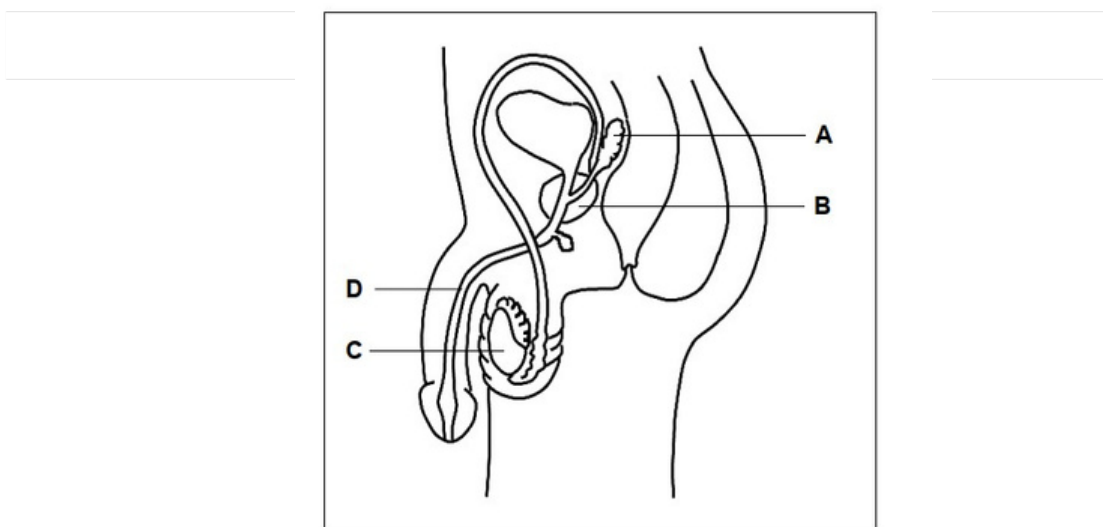
(7 x 1) (7)

- 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 Stores sperms temporarily until mature | A: Scrotum B: Epididymis |
| 1.3.2 The functional connection between two consecutive neurons | A: Synapse B: Receptor |
| 1.3.3 A structure in the ear that absorbs access pressure waves from the cochlea | A: Round window B: Oval window |

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

- 1.4 The diagram represents the male reproductive system.



- 1.4.1 Give the LETTER and the NAME of the:

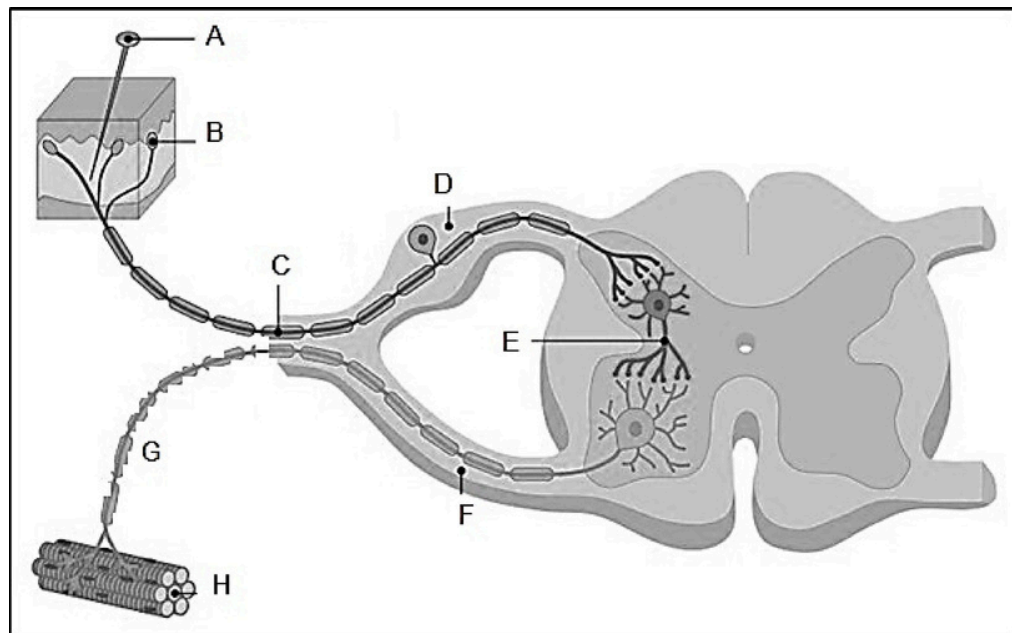
- (a) Gland that protects sperm against low pH in the vagina (2)
(b) Duct that transports semen and urine to the outside of the body (2)

- 1.4.2 Name:

- (a) Part **A** (1)
(b) The hormone secreted by **C** (1)

- 1.4.3 Name the type of gametogenesis that occurs in part **C**. (1)
(7)

1.5 The diagram below represents a reflex arc.



1.5.1 Give the LETTER and the NAME of the neuron that:

- (a) Receives impulses from a receptor (2)
- (b) Passes signals from one neuron to another (2)

1.5.2 Name the process that takes place in the body when pin **A** touches the skin. (1)

1.5.3 A disorder caused by the immune system of the human body is visible in the diagram.

- (a) Identify the disorder of the nervous system shown in neuron **G**. (1)
- (b) Give ONE reason for your answer to QUESTION 1.5.3.(a) (2)

1.5.4 Explain the effect of the disorder mentioned in QUESTION 1.5.3.(a) on this reflex arc. (2)
(10)

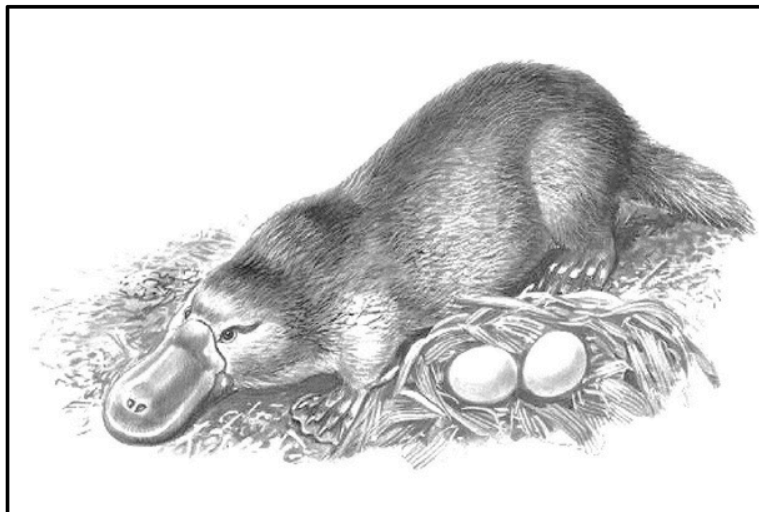
TOTAL SECTION A: [50]

SECTION B

QUESTION 2

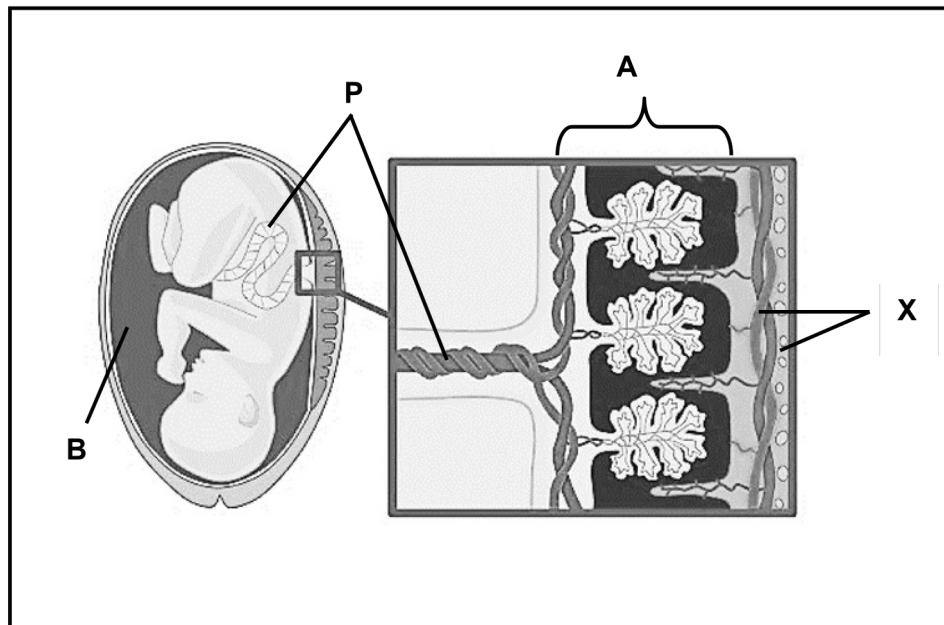
2.1 Read the extract on Platypuses mammals below:

Platypuses, mammals endemic to eastern Australia, lay eggs and produce milk. After mating, a pregnant female builds a nest for her eggs in a long hole. After a gestation period of 21 days, she will lay 1 to 3 eggs in her nest. During the egg development period of about 10 days, a female holds the eggs pressed by her tail to her belly, while curled up. Newly hatched platypuses are vulnerable, blind, and hairless, and are fed by the mother's milk, that provides all the requirements for growth and development. They concentrate milk to their belly and feed their young by sweating it out.



- 2.1.1 Which type of fertilisation occurs in these mammals? (1)
- 2.1.2 Give ONE reason for your answer in QUESTION 2.1.1. (2)
- 2.1.3 Do these mammals show altricial or precocial development? (1)
- 2.1.4 State TWO characteristics of the platypuses for your answer in QUESTION 2.1.3. (2)
- 2.1.5 Describe parental care that the platypus applies. (2)
- (8)**

2.2 The diagram below shows the development of the human foetus.



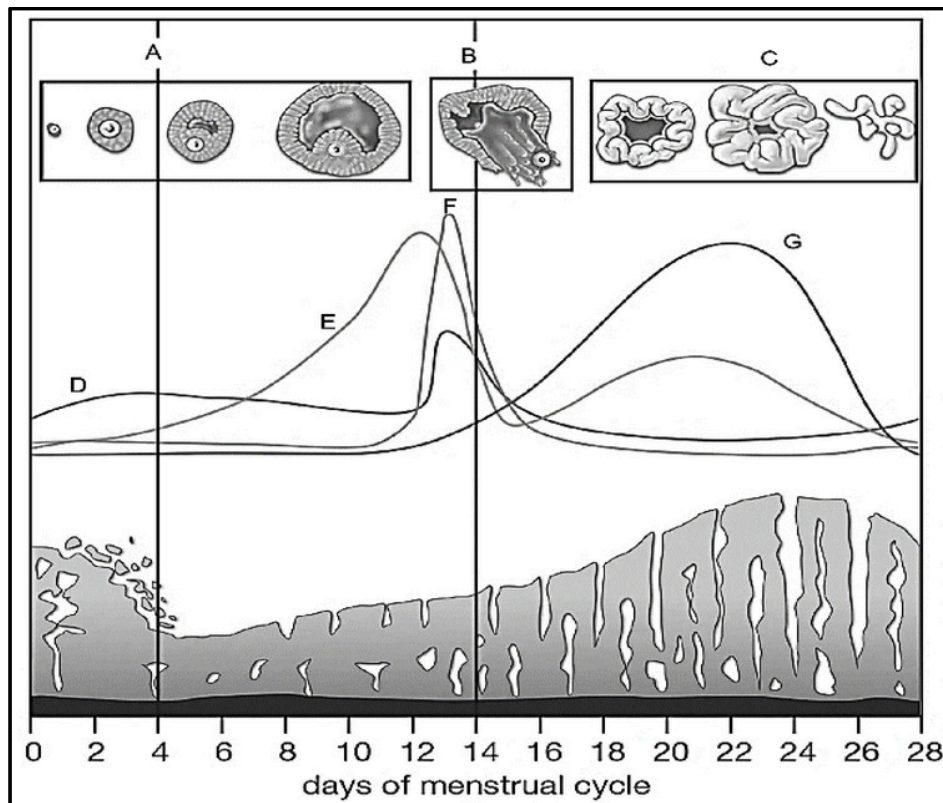
2.2.1 Give the LETTER and the NAME of the TWO structures that form the placenta. (4)

2.2.2 Name and describe the structure and functions of **A**. (6)

2.2.3 Describe ONE function of **B** with reference to protection. (1)

(11)

2.3 The graph below represents the levels of the female hormones during ovulation and menstruation.



2.3.1 Give the NAME of the hormone responsible for process:

(a) **B** (2)

(b) **C** (2)

2.3.2 Suggest a possible reason for the maintenance of a high level of hormone **G** beyond the 28-day cycle. (2)

2.3.3 Explain why the secretion of hormone **E** is inhibited by the high levels of **G**. (3)
(9)

- 2.4 An investigation was conducted to determine the effect of zinc supplements on the levels of testosterone in the blood of males who participate in weightlifting.

The procedure was as follows:

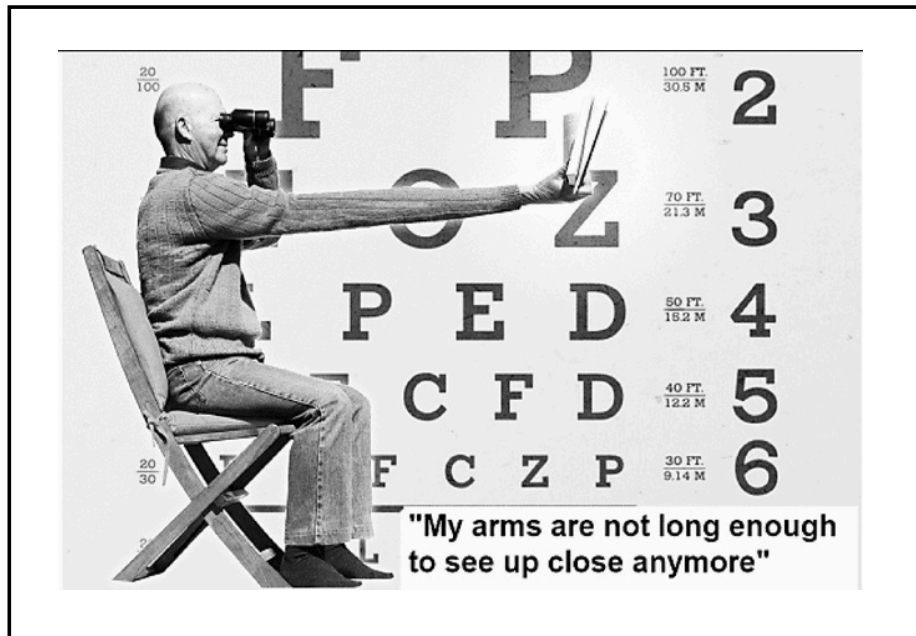
- 60 healthy males who participate in weightlifting were selected to participate in the investigation.
- They were of the same age.
- They were given the same diet for 6 weeks.
- Their testosterone levels in the blood were measured every day for the 6-week-period.
- They were then given a zinc supplement with their diet daily for another 6 weeks.
- The testosterone levels in blood were again measured every day.
- The average levels of testosterone in blood were calculated before and after the zinc supplement

Their average testosterone levels before and after administering the zinc supplement are shown in the table below.

| | Average testosterone in blood ($\mu\text{gU/mL}$) |
|--|--|
| Before administering the zinc supplement | 16,8 |
| After administering the zinc supplement | 22,5 |

- 2.4.1 Identify for this investigation the:
- (a) Independent variable (1)
- (b) Dependent variable (1)
- 2.4.2 Explain why they measured the testosterone levels before and after the zinc supplement was administered. (2)
- 2.4.3 State TWO ways in which the reliability of the results was ensured for this investigation. (2)
- 2.4.4 Name TWO variables that should have been considered about the zinc supplements to ensure the validity of the investigation. (2)
- 2.4.5 Write a conclusion that can be drawn from the results obtained. (2)
- (10)**

2.5 The diagram below illustrates an eye defect.

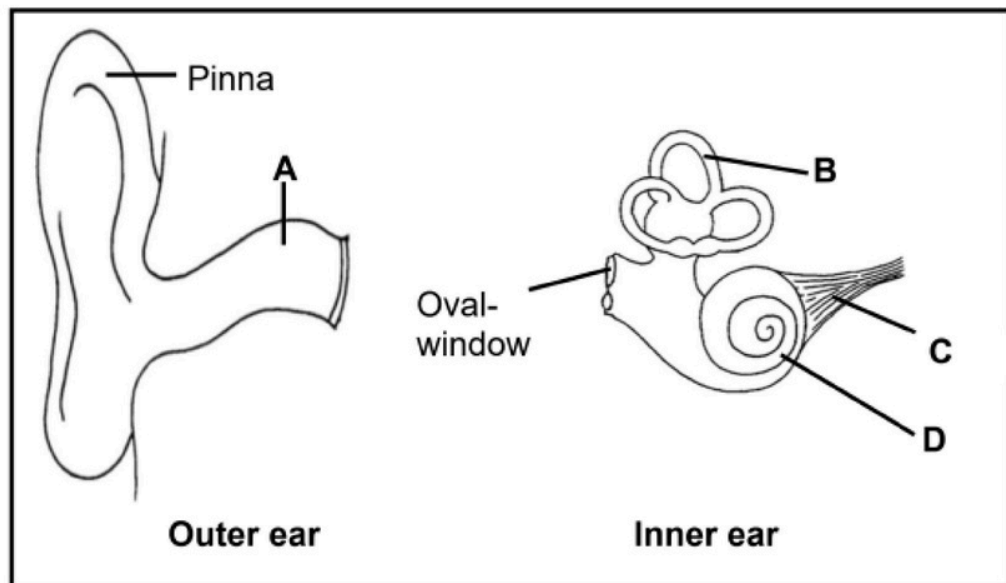


- 2.5.1 Identify the eye defect shown in the diagram above. (1)
- 2.5.2 State THREE causes for this defect identified in QUESTION 2.5.1. (3)
- 2.5.3 The defect illustrated in the diagram above can be corrected by wearing glasses. Which shape of lenses will be prescribed? (1)
- 2.5.4 Name the ability of humans to focus on an object using both eyes that give a single image. (1)
- 2.5.5 The man in the diagram moves to a darker room.
- (a) What change will occur in his eyes? (1)
- (b) Which part of the eye will be responsible for this change? (1)
- (c) Describe the process that will bring about the change mentioned in QUESTION 2.5.5 (a). (4)

TOTAL QUESTION 2: (12)
[50]

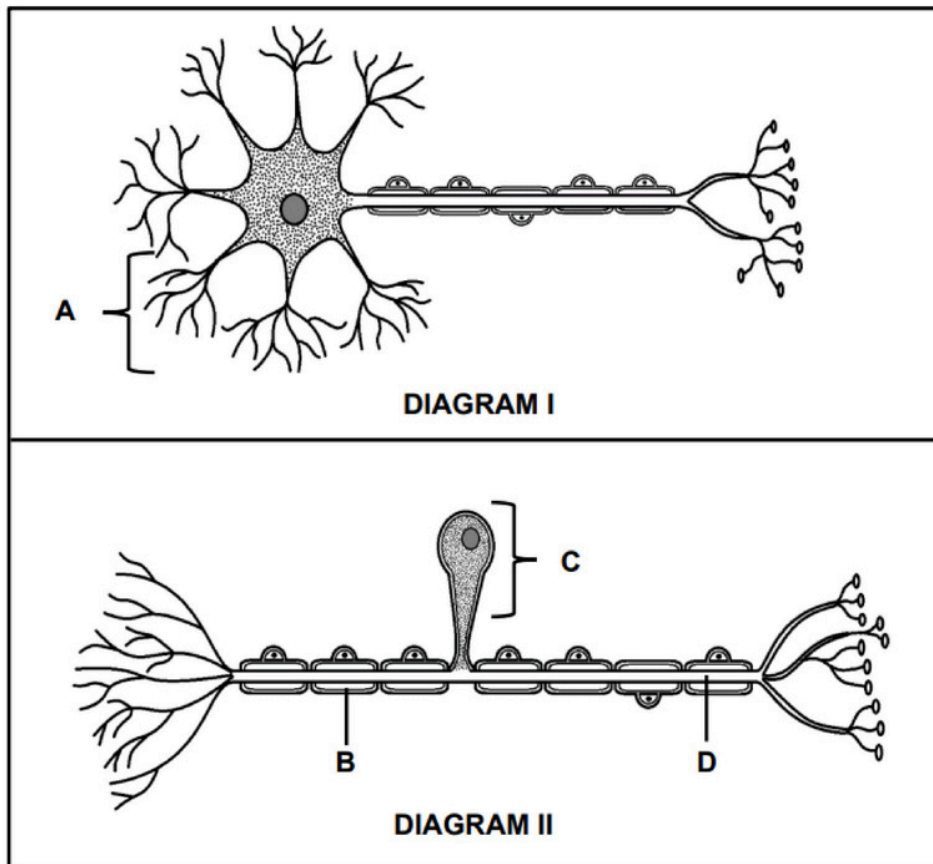
QUESTION 3

3.1 The diagram below represents the outer and inner ear of humans.



- 3.1.1 Give the letter and name of the part that:
- (a) Transmits impulses to the brain (2)
 - (b) Contains glands that produces earwax (2)
- 3.1.2 Describe the role of the middle ear in equalising air pressure. (2)
- 3.1.3 Explain how part **B** restores balance when a person trips over a log. (6)
- (12)**

3.2 The diagrams below represent two types of neurons:



3.2.1 Identify the neuron in

(a) Diagram I (1)

(b) Diagram II (1)

3.2.2 Tabulate TWO differences between the neurons above. (5)

3.2.3 Identify structure:

(a) A and state ONE function of it. (2)

(b) D (1)

(10)

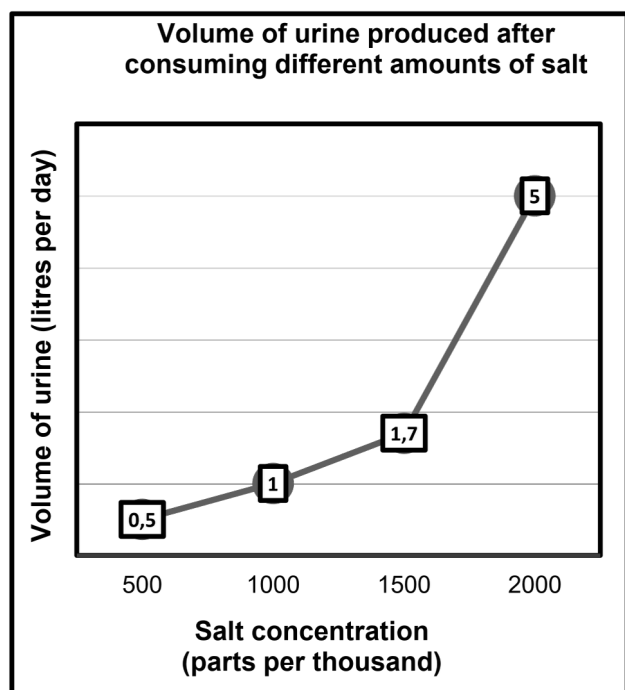
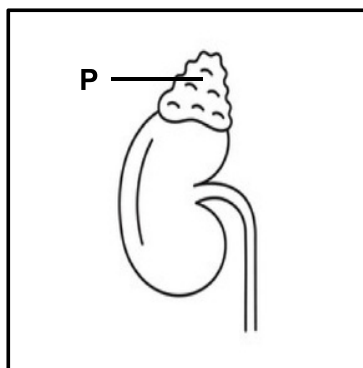
3.3 The diagram and the graph below relate to the control of salt levels in the body.

An investigation was conducted to determine the relationship between the amount of salt consumed and the volume of urine produced.

The 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 07:00
- 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

The results are shown in the graph below.



3.3.1 Identify gland **P** (1)

3.3.2 Name the hormone produced by gland **P** which:

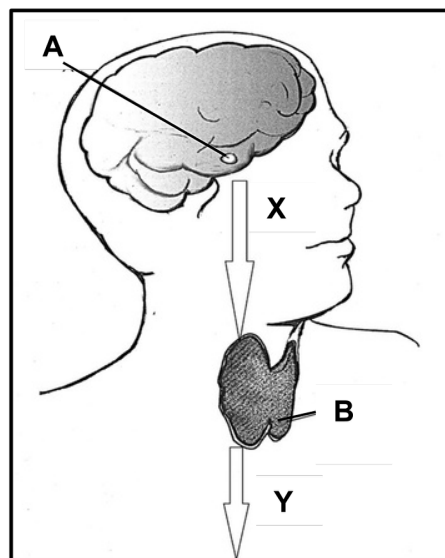
(a) Controls salt concentration in the blood (1)

(b) Prepares the body for emergency (1)

3.3.3 Calculate the percentage increase in the volume of urine between 500 and 1 000 parts per thousand. Show all your working. (3)

3.3.4 Explain the results of this investigation as presented in the graph. (5)
(11)

3.4 Study the diagram which shows the relationship between two endocrine glands.



3.4.1 Identify gland: (1)
(a) **A**

(b) **B** (1)

3.4.2 Which interaction/mechanism is depicted by this diagram? (1)

3.4.3 Identify hormone: (1)
(a) **X**

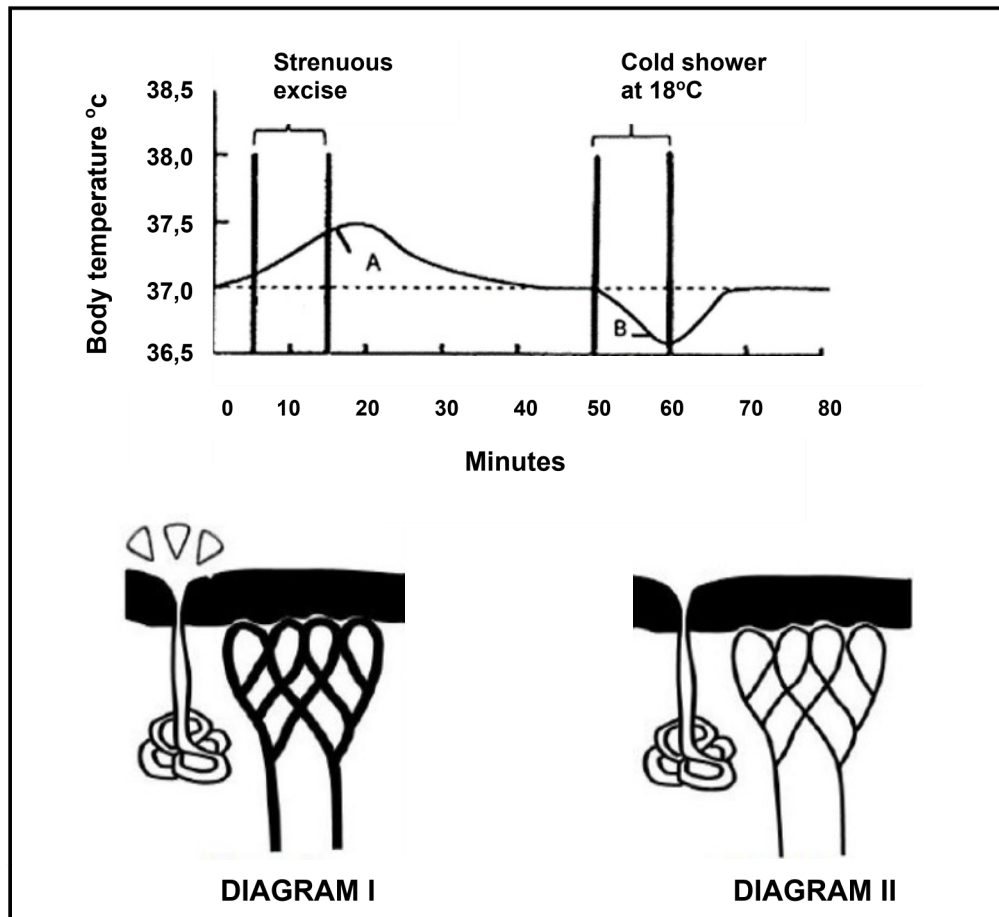
(b) **Y** (1)

3.4.4 What effect does an: (2)
(a) Over-secretion, and an

(b) Under-secretion of hormone **X** have on the production of hormone **Y**. (2)

(9)

- 3.5 The graph and diagrams below indicate the effect of strenuous exercise, followed by a cold shower, on the body temperature of an athlete.



- 3.5.1 Which part of the brain responds to the changes in temperature that occur at **A** and **B**, as seen on the graph? (1)
- 3.5.2 How long did the person engage in strenuous exercise? (1)
- 3.5.3 Which diagram **I** or **II** would represent the condition of the skin after 15 min? (1)
- 3.5.4 Explain your answer to QUESTION 3.5.3 (5)
- (8)**

TOTAL SECTION B: [100]
GRAND TOTAL: [150]