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GRADE 12

LIFE SCIENCES PRE-TRIAL
PAPER 1
AUGUST 2024

MARKS: 150

TIME: 2 ½ hours

This question paper consists of 17 pages

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions

1. Answer ALL the questions.
2. Write all answers in the ANSWER BOOK.
3. Start the answers to EACH question at the top of a NEW page.
4. Number the answers according to the numbering system used in the 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, 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.

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 1.1.10) in your **ANSWER BOOK**, for example 1.1.11 D.

1.1.1 Which ONE of the following is a function of ossicles?

- A Causes vibrations on the eardrum
- B Reduces pressure in the middle ear
- C Amplifies pressure waves in the inner ear
- D Amplifies vibration in the middle ear

1.1.2 Below is a list of terms relating to reproduction in vertebrates:

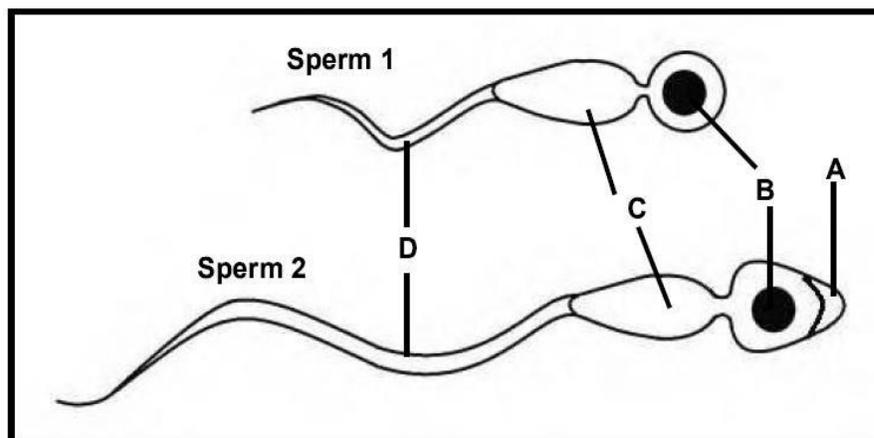
- (i) Precocial development
- (ii) Altricial development
- (iii) Amniotic egg
- (iv) Parental care

Which of the terms above refer to strategies used by birds that incubate their eggs in a nest and feed their young until they are able to fly?

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



1.1.3 QUESTION 1.1.3 AND 1.1.4 ARE BASED ON THE FOLLOWING. DIAGRAM OF TWO SPERM CELLS THAT ARE DRAWN TO SCALE



Which part(s) play(s) a role in the movement of sperms?

- A A only
- B B only
- C C and D
- D C only

1.1.4 Which ONE of the following is the CORRECT MATCH of the differences between sperm 1 and sperm 2?

	Sperm 1	Sperm 2
A	Longer tail	Shorter tail
B	Has no acrosome	Has acrosome
C	Diploid nucleus	Haploid nucleus
D	More motile	Less motile

1.1.5 Below is a list of events during hearing:

- (i) The organ of Corti is stimulated
- (ii) Impulses are sent via the auditory nerve to the cerebrum
- (iii) Pressure waves are set up in the endolymph
- (iv) Impulse is interpreted in the cerebrum
- (v) Sound waves strike the tympanic membrane

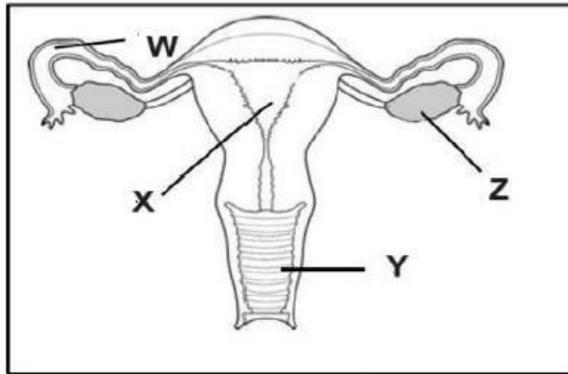
Which ONE of the following is a correct sequence of events during hearing?

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

1.1.6 The level of aldosterone will most likely increase after...

- A Consuming food with high a high salt content
- B Sweating excessively
- C Consuming food with a high glucose content
- D The constriction of blood vessels to the skin

1.1.7 In which structure does fertilisation take place?



- A W
- B Z
- C Y
- D X

1.1.8 Which of the following are plant growth hormones?

- A Prolactin and abscisic acid
- B Abscisic acid and glucagon
- C Gibberellins and abscisic acid
- D ADH and gibberellins

1.1.9 When the level of blood glucose rises, the body immediately reacts to lower the level by secreting...

- A Glycogen
- B Insulin
- C Glucagon
- D Adrenalin

1.1.10 A person experiences the following symptoms:

- Loses weight easily
- Is always hungry
- Never feels cold

The most likely explanation for this combination of symptoms is that the person...

- A Secretes too much growth hormone
- B Has an overactive thyroid gland
- C Is diabetic and just had an insulin injection
- D Has an underactive hypothalamus

(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 number (1.2.1 to 1.2.10) in the ANSWER BOOK.

1.2.1 The part of the amniotic egg which stores waste.

1.2.2 The membrane that, together with the endometrium, forms the placenta

1.2.3 Hormone that is produced after ovulation to thicken the endometrium.

1.2.4 The part of the nervous system which increases breath rate during an exercise.

1.2.5 A disorder caused by the degeneration of the myelin sheath of motor neurons.

1.2.6 A hormone responsible for milk production in human females.

1.2.7 A hollow ball of cells formed from the zygote.

1.2.8 Water regulation in the body.

1.2.9 An eye defect caused when the lens cannot flatten enough to focus the light on the retina.

1.2.10 Plant growth responses to external stimuli.

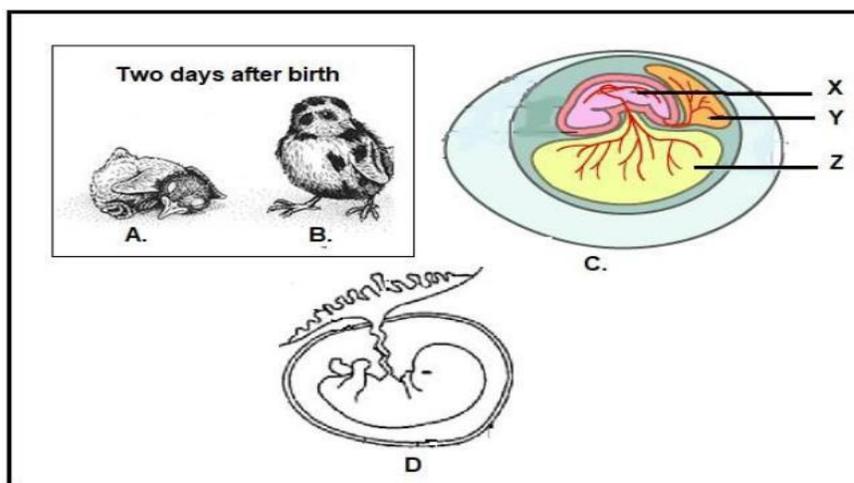
(10 x 1) (10)

- 1.3 Indicate whether each of the following 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 1.3.4) in the ANSWER BOOK.

COLUMN I	COLUMN II
1.3.1 Hormone secreted by the pituitary gland	A: Growth hormone B: FSH
1.3.2 The innermost membrane surrounding the foetus	A: Chorion B: Cell membrane
1.3.3 The type of gland that has a duct to carry its secretion to where it is needed	A: Endocrine gland B: Exocrine gland
1.3.4 Microscopic gap between the end of an axon of one neuron and the dendrites of another neuron.	A: Interneuron B: Synapse

(8)

- 1.4 The diagram below represents parts of the amniotic egg.



- 1.4.1 Name the parts labelled:

- (a) X (1)
(b) Y (1)

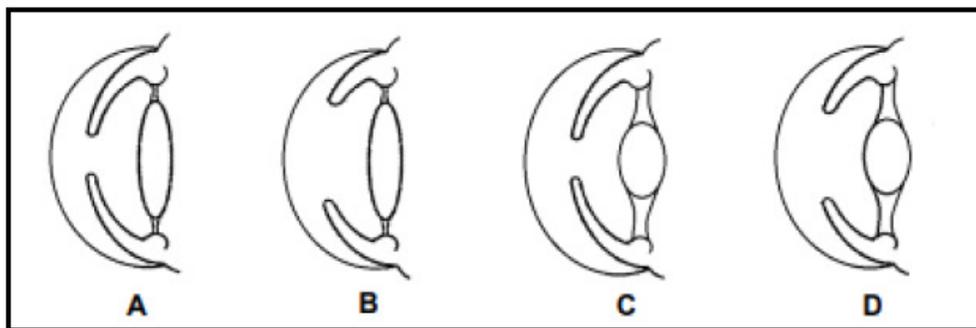
- 1.4.2 Write only the LETTER/S of the diagram/s that represent/s:

- (a) Ovipary (1)
(b) Vivipary (1)

- 1.4.3 Write only the LETTER of the diagram that represents precocial development. (1)

(5)

1.5 The diagram below represent changes in the human eye.



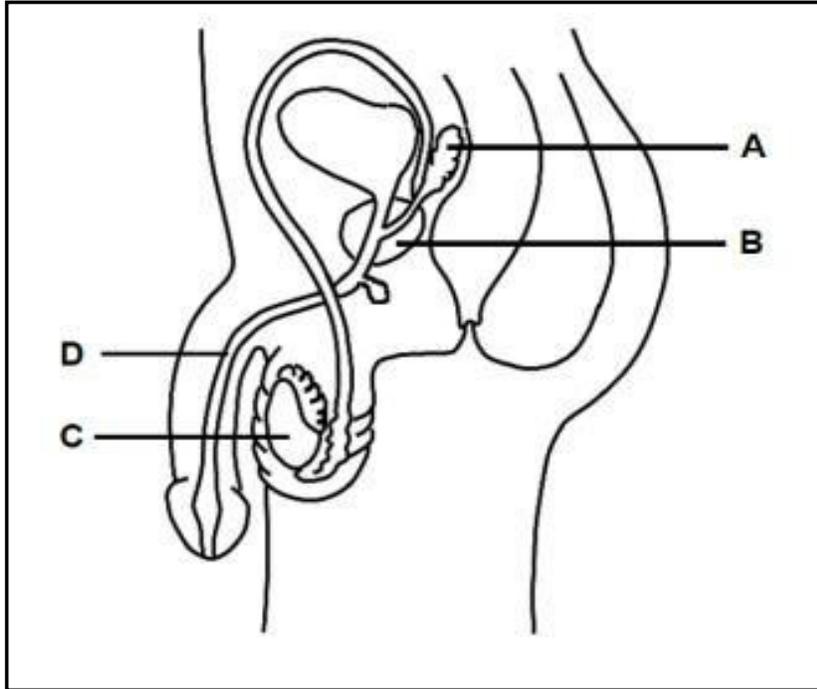
- 1.5.1 Name the process that occurs when the curvature of the lens changes to focus on a near or distant object. (1)
- 1.5.2 Give the LETTERS of TWO diagrams (A, B, C or D) that represent the eye of a person whose:
- (a) Ciliary muscle are contracted (1)
 - (b) Radial muscle are relaxed (1)
- 1.5.3 Give the LETTERS of TWO diagrams (A, B, C or D) that represent the condition of the eye of a person:
- (a) In dim light (2)
 - (b) Focusing on a distant object (2)

TOTAL SECTION A: 50



SECTION B**QUESTION 2**

2.1 The diagram below represents the human male reproductive system.



- 2.1.1 Identify structure **A** (1)
- 2.1.2 State ONE function of part **D** in reproduction. (1)
- 2.1.3 Name the type of gametogenesis that occurs in part **C**. (1)
- 2.1.4 Explain how the secretions of structures **A** and **B** improve the chances of fertilisation. (4)
- (7)**

2.2 Read the extract below about a medical condition in male babies called cryptorchidism.

Cryptorchidism occurs in new-borns when one or both of the testes do not descend into the scrotal sac at birth, but remains inside the abdominal cavity.

Cryptorchidism occurs in approximately 3–5% of full-term male infants while approximately one third of premature male babies are born with this condition.

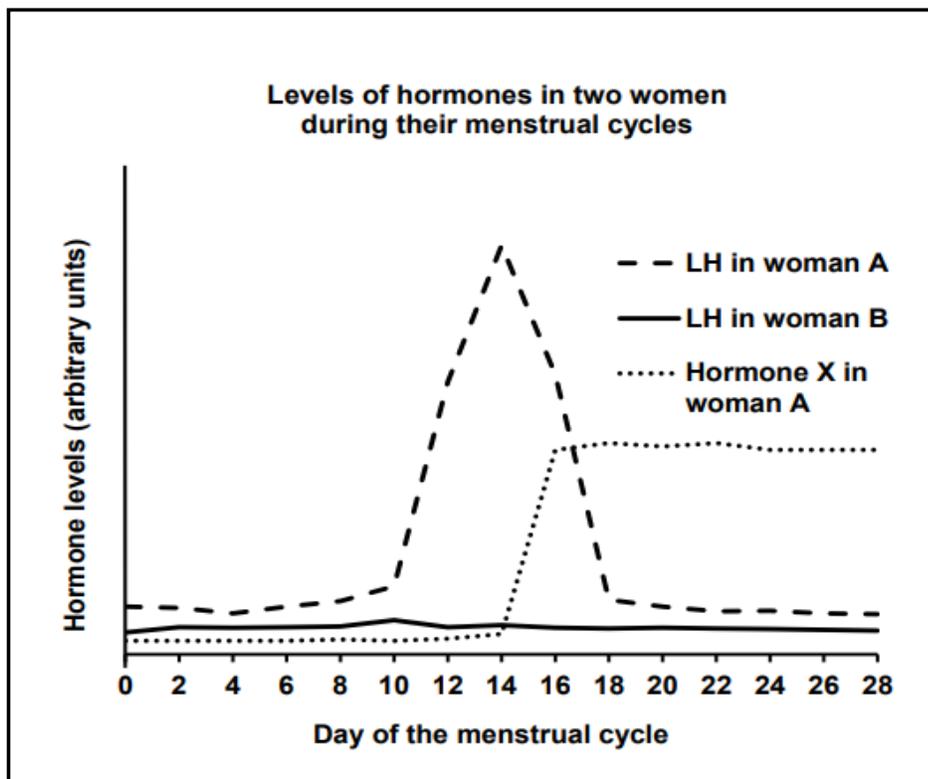
If the testes do not descend naturally by the age of one, treatment is needed. Treatment may involve administering testosterone, but the most common treatment is surgery.

If cryptorchidism is not resolved, it may lead to infertility when both the testes do not descend and an increased risk of testicular cancer by the age of 30 to 40 years.

- 2.2.1 State ONE function of testosterone not mentioned in the extract above (1)
- 2.2.2 According to the extract, state TWO ways in which cryptorchidism is treated. (2)
- 2.2.3 What percentage of premature male babies are born with cryptorchidism? (1)
- 2.2.4 From the extract, give ONE reason, other than infertility, why cryptorchidism needs to be treated if the condition is not resolved naturally. (1)
- 2.2.5 Explain why undescended testes may lead to infertility in young males. (2)
- 2.2.6 Describe the process of gametogenesis by which sperm cells are formed. (3)
- (10)**

- 2.3** Sheehan's syndrome is a condition that results in females having very low levels of the luteinising hormone (LH).

The graph below shows the hormone levels of two different women during a 28-day menstrual cycle. Woman A has normal luteinising hormone (LH) levels while woman B suffers from Sheehan's syndrome.



- 2.3.1 State TWO functions of LH during the menstrual cycle. (2)
- 2.3.2 Besides LH, name ONE other hormone that is secreted by the pituitary gland during the menstrual cycle. (1)
- 2.3.3 Give the name of hormone X. (1)
- 2.3.4 Use the information in the graph to explain how the level of hormone X will be different in woman B. (4)
- 2.3.5 What evidence in the graph suggests that woman A is pregnant? (1)
- 2.3.6 If woman A is pregnant a diploid cell is formed, name and explain how the diploid cell develops until implantation occurs. (4)

(13)

- 2.4** The table below shows the concentration of abscisic acid and gibberellins in germinating seeds over 10 days.

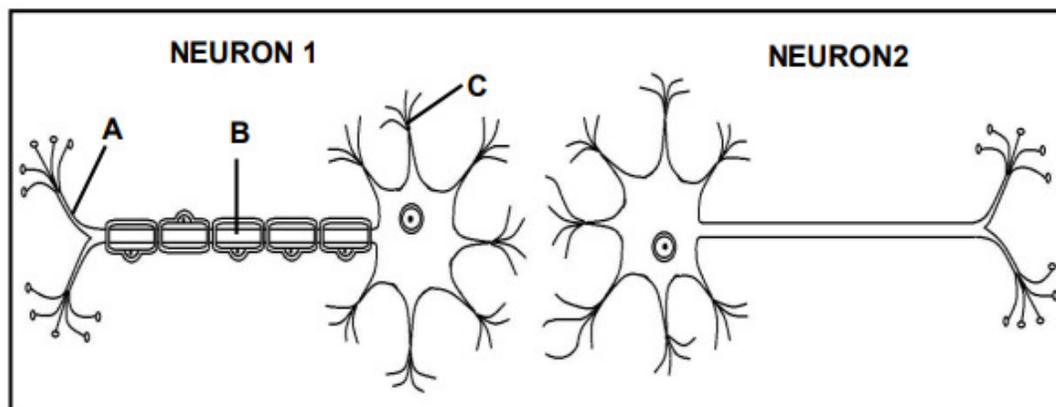
TIME (DAYS)	HORMONE CONCENTRATION IN GERMINATING SEEDS (ARBITRARY UNITS)	
	ABSCISIC ACID	GIBBERELLINS
0	20	0
2	8	1
4	4	4
6	3	7
8	2	10
10	1	12

- 2.4.1 Draw a line graph to show the changes in the concentration of abscisic acid over the period of the investigation. (6)

- 2.4.2 Explain the growth response of a plant when the stem is exposed to light coming from one side only. (4)

(10)

2.5 The diagram below represents a type of neuron found in human body

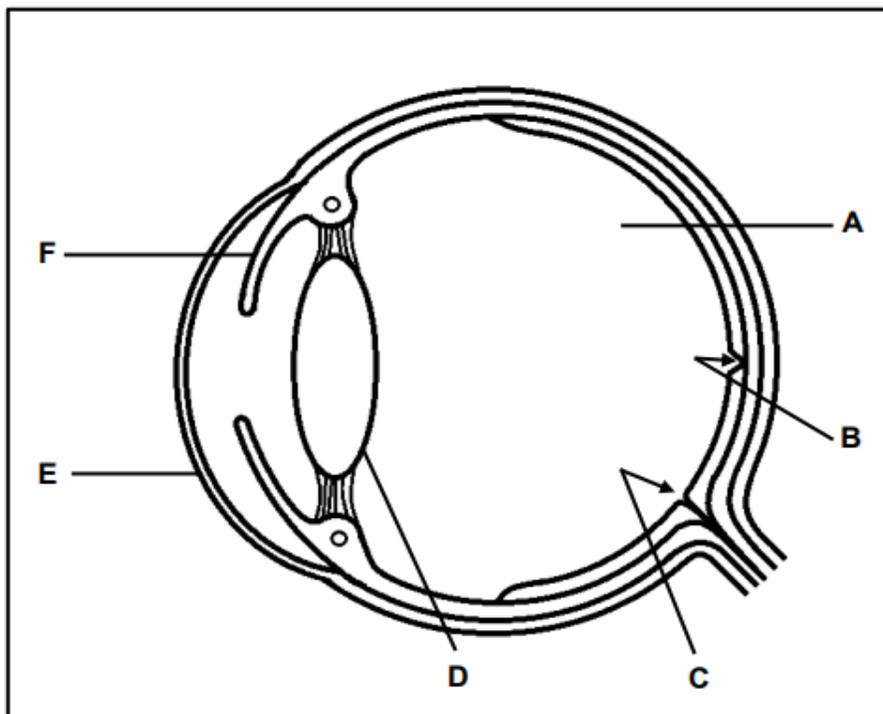


- 2.5.1 Identify the type of neuron shown. (1)
- 2.5.2 Using the LETTERS A, B AND C only, give the correct sequence for the transmission of an impulse along neuron 1. (3)
- 2.5.3 Explain how the speed of transmission of impulses will differ for neuron 1 and neuron 2 (3)
- 2.5.4 Explain why a person will feel the stimulus but will not be able to respond if only type of neuron is damaged. (3)

(10)
[50]

QUESTION 3

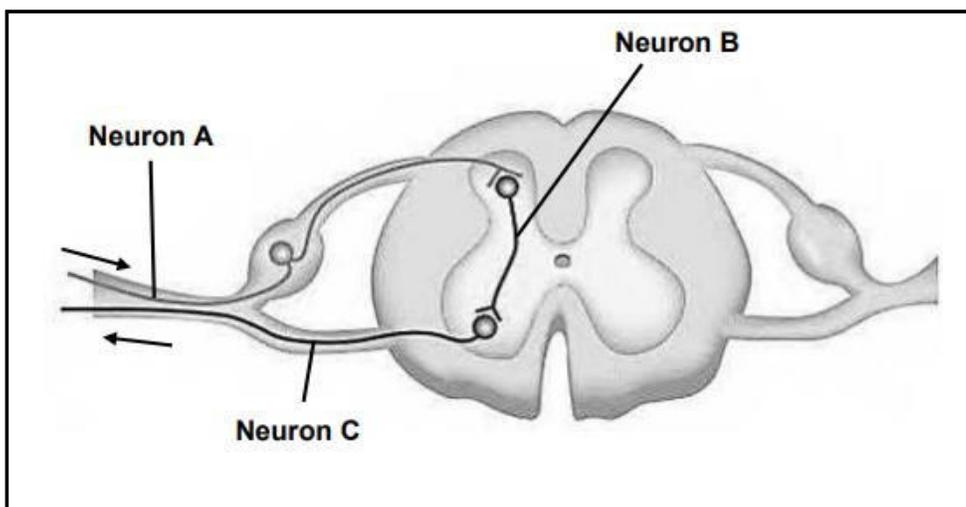
3.1 The diagram below represents the human eye.



- 3.1.1 Identify structure F (1)
- 3.1.2 State TWO functions of fluid A. (2)
- 3.1.3 Describe the structural difference between area B and area C. (2)
- 3.1.4 Name the visual defect that occurs when the curvature of part E is uneven. (1)
- 3.1.5 Describe the process of accommodation that takes place when an object is less than 6 metres away from the eye. (5)

(11)

3.2 The diagram below represents a reflex arc.



- 3.2.1 What is a reflex action? (2)
- 3.2.2 Explain the effect on the reflex action when neuron C is damaged. (2)
- 3.2.3 Name the disorder that is the result in the breakdown of the myelin sheath of neurons. (1)
- 3.2.4 Draw a fully labelled diagram of neuron C to show its structure. (4)
- (9)**

3.3 Describe the role of the structures of the ear from the time that a sound wave reaches the ear until pressure waves are set up in the inner ear. (8)

3.4 An investigation was carried out to determine the influence of alcohol on the volume of urine produced.

12 healthy, 22-year-old males of similar height and mass participated in the investigation.

The investigation was conducted as follows:

- The men were divided into two groups of six each, Group **A** and Group **B**.
- The two groups ate the same food and did the same exercise for the 24-hour-period before testing
- Each group was given the following to drink after the 24-hour-period:
 - Group **A**: 1 litre of alcohol-free beer (beer that does not contain alcohol)
 - Group **B**: 1 litre of alcoholic beer
- Urine was collected from each man every hour.

Assume that the volume of urine collected is equal to the volume of urine produced.

The results of the investigation are shown in the table below.

TIME OF COLLECTION	AVERAGE VOLUME OF URINE COLLECTED (mℓ)	
	GROUP A	GROUP B
After 1 hour	599	643
After 2 hours	413	504
After 3 hours	112	132

3.4.1 State:

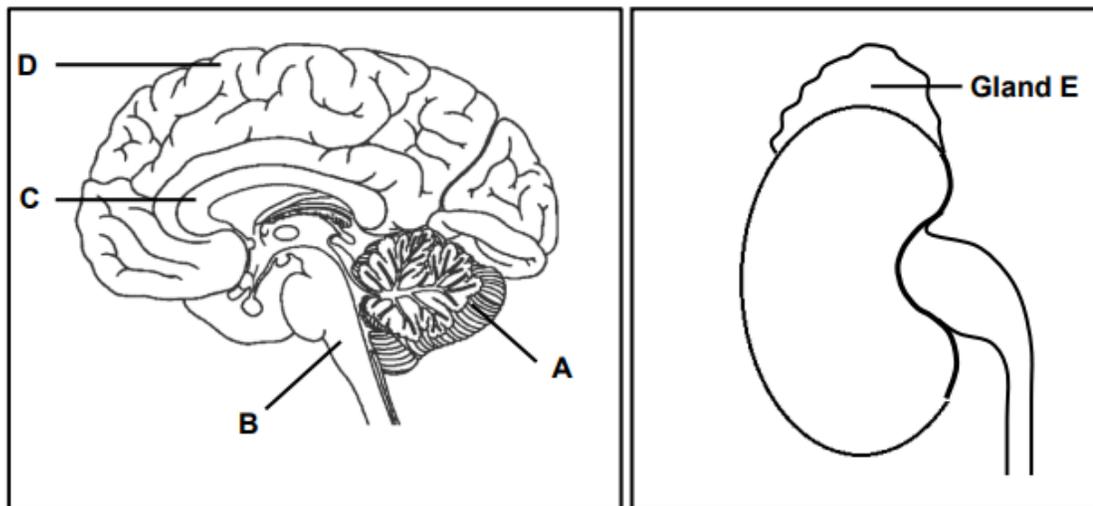
- (a) The dependent variable in this investigation. (1)
- (b) TWO planning steps the investigators had to take before the investigation could start (2)
- (c) TWO factors that need to remain constant, other than the ones already mentioned (2)
- (d) TWO steps that the investigators took to ensure the reliability of the investigation (2)

3.4.2 Based on the results, explain how the intake of alcohol influences the secretion of ADH and consequently the volume of urine that is produced by the kidneys. (5)

(12)



3.5 The diagrams below show the human brain and human kidney.



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

3.5.2 Describe the location of the corpus callosum. (2)

3.5.3 A person sustained a head injury in a car accident and lost his memory.

Write down the LETTER and NAME of the part of the brain that was affected (2)

3.5.4 During an emergency situation, gland **E** releases a hormone that prepares the body for a 'fight or flight' response by stimulating an increase in breathing rate and heart rate. This increase leads to increased energy production in the skeletal muscles and an increase in blood carbon dioxide levels.

(a) Name the hormone secreted by gland **E** in an emergency situation. (1)

(b) Explain how an increase in breathing rate and heart rate results in increased energy production in skeletal muscles. (4)

(10)
[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150