



**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

SEPTEMBER 2023

LIFE SCIENCES P1

MARKS: 150

TIME: 2½ hours

Font size 18

This question paper consists of 25 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 answer 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, 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 may 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 given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question numbers (1.1.1 to 1.1.9) in the ANSWER BOOK, for example 1.1.10 D.

1.1.1 Which ONE of the following glands in the human body is an endocrine gland?

- A Prostate gland
- B Salivary gland
- C Thyroid gland
- D Sweat gland

1.1.2 Below is a list of effects caused by hormones.

- (i) Constriction of the blood vessels of the skin
- (ii) Increases blood circulation to the skin
- (iii) Speeds up the conversion of glycogen into glucose
- (iv) Reduces the breathing rate

Which of the following effects are caused by adrenalin?

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

1.1.3 The blood glucose level of a human is influenced by ...

- A thyroxin, glucagon and adrenalin.
- B insulin, glucagon and adrenalin.
- C insulin, aldosterone and glucagon.
- D thyroxin, insulin and aldosterone.

1.1.4 Which part of the brain processes visual impulses?

- A Cerebrum
- B Cerebellum
- C Medulla oblongata
- D Hypothalamus

1.1.5 A grommet is inserted into the tympanic membrane of the ear in order to ...

- A allow bacteria to leave the infected area.
- B allow air to continuously enter the middle ear.
- C administer ear drops directly into the infected area.
- D monitor healing process daily.

1.1.6 Which part of the eye contains the photoreceptors?

- A Sclera
- B Choroid
- C Retina
- D Cornea

1.1.7 Contraceptives are used by many women to prevent pregnancy. An investigation was conducted to test the effectiveness of different contraceptives.

Which ONE of the following results can be used to conclude which contraceptive was the most effective?

- A Number of women that fell pregnant.
- B Number of women that remained non-pregnant.
- C Frequency of bleeding amongst the women.
- D Amount of blood lost during each menstruation.

1.1.8 Which part of the sperm releases an enzyme to dissolve the outer membrane of the ovum?

- A Acrosome
- B Mitochondria
- C Nucleus
- D Chromatin

1.1.9 Human immuno-deficiency virus (HIV) is transmitted from an infected person to another person through body fluids.

An infected man who has had vasectomy (a surgical procedure that cuts and ties up vas differentia) is still able to transmit the HI virus during sexual intercourse because ...

- A he is still able to ejaculate sperm that carry the virus.
- B he can ejaculate the secretions containing the virus from accessory glands.
- C the traces of urine in the urethra contain the virus.
- D the lining of urethra releases the virus during ejaculation.

(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 numbers (1.2.1 to 1.2.9) in the ANSWER BOOK.

1.2.1 The coiled tube outside the testis that store sperms until they mature

1.2.2 The changes that occur in the ovary and uterus of a female over a period of 28 days

1.2.3 The site of fertilisation

1.2.4 A hollow ball of cells into which the fertilised ovum develops

1.2.5 The structure that receives stimuli from the environment

1.2.6 The liquid that fills the space between the cornea and the lens

1.2.7 The receptors in the cochlea

1.2.8 The part of the brain that controls the carbon dioxide levels in the blood

1.2.9 A group of endocrine cells in the pancreas that secrete insulin

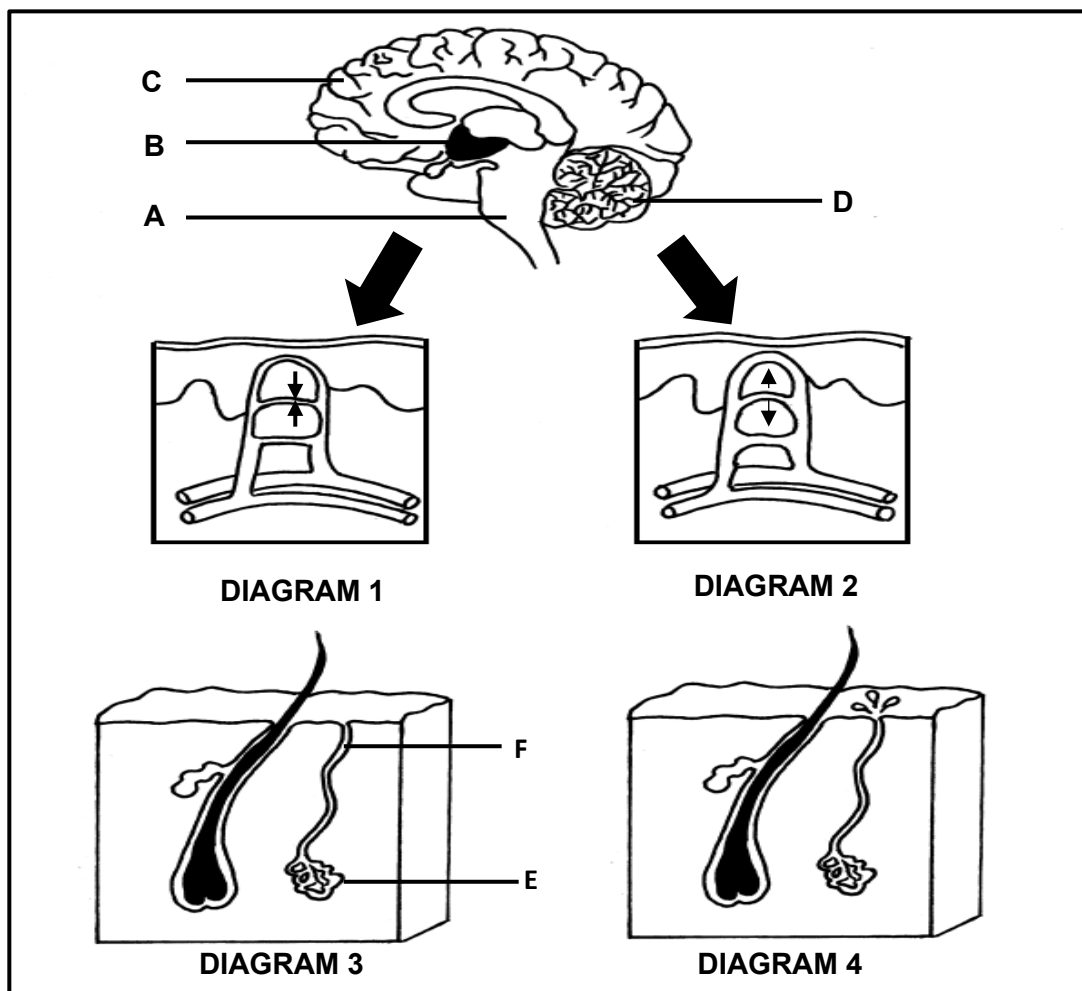
(9 x 1) (9)

- 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 Male hormone secreted by the testes	A: TSH B: Thyroxin
1.3.2 Secondary sexual characteristics in females	A: Development of breasts B: Development of pubic hair
1.3.3 The protective membranes that cover the brain and the spinal cord	A: Germinal epithelium B: Meninges

(3 x 2) (6)

1.4 Diagrams 1, 2, 3 and 4 below, show part of a homeostatic process in humans.



1.4.1 Identify the homeostatic process represented in the diagram above. (1)

1.4.2 Name the process that is represented in:

(a) DIAGRAM 1 (1)

(b) DIAGRAM 2 (1)

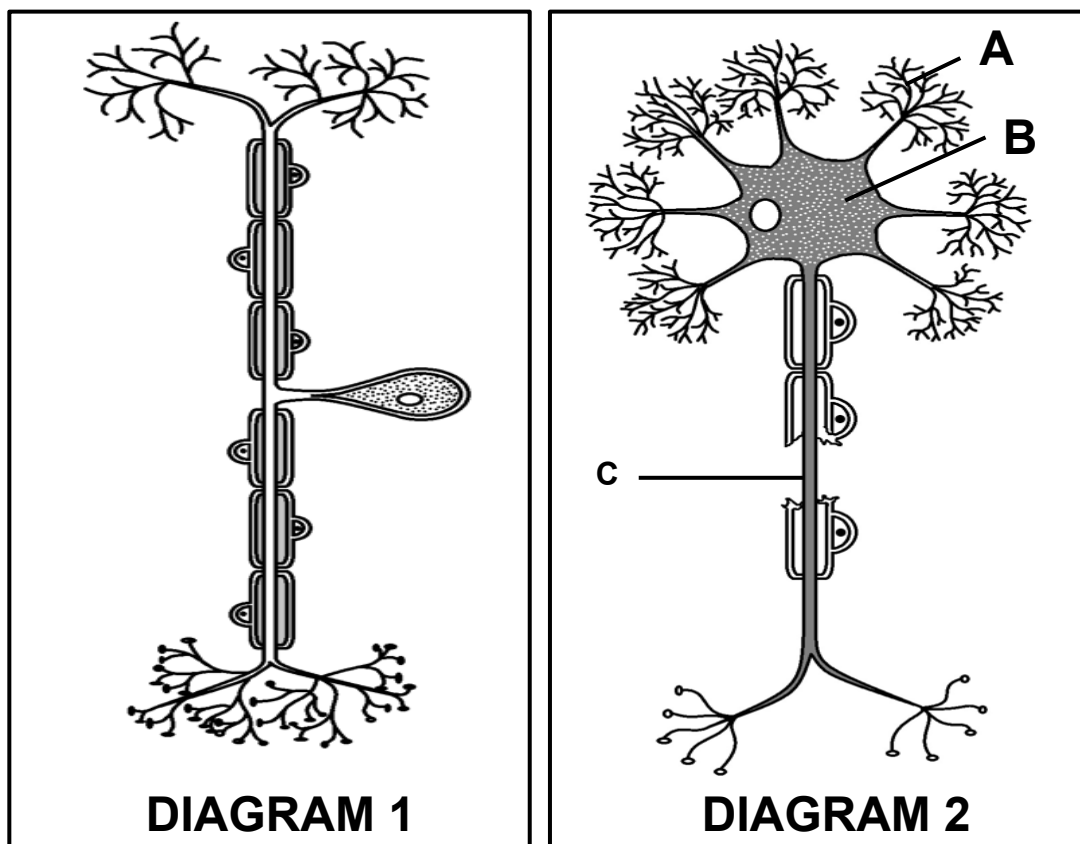
1.4.3 Give the LETTER and NAME of the part that:

(a) Controls the homeostatic process represented in the diagrams (2)

(b) Is less active on a very cold day (2)

1.4.4 State the importance of the process taking place in DIAGRAM 4. (2)

1.5 The diagram below represents two neurons of the human nervous system.



1.5.1 Identify part **B**. (1)

1.5.2 Name the part(s) that:

(a) Receives impulses and transmit it to part **B** (1)

(b) Transmits impulses away from part **B** (1)

1.5.3 Identify the neuron represented by DIAGRAM 1. (1)

1.5.4 Name the type of neuron that serves as a link between the neurons in DIAGRAM 1 and 2 in the central nervous system. (1)

1.5.5 DIAGRAM 2 shows a structural defect of the neuron.

State the:

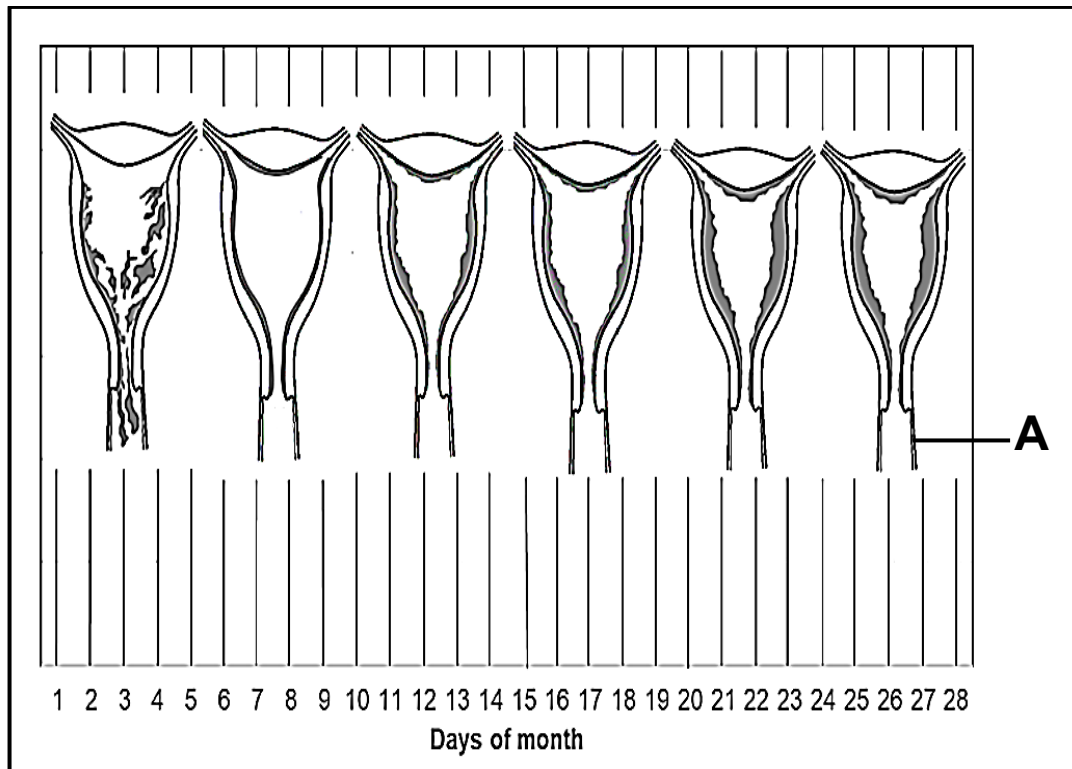
- (a) Defect shown in the diagram (1)
- (b) Effect of the defect on the transmission of impulse (1)
- (c) Name of the disorder caused by this defect (1)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

- 2.1 The diagram below represents different stages of development of the lining in the uterus during the menstrual cycle.



- 2.1.1 Identify:

- (a) Part **A** (1)
- (b) The process that occurs during the first 4 days (1)

- 2.1.2 Name the ovarian hormone that is at a higher level from day 15–28. (1)

- 2.1.3 Explain the thickening of the uterine lining from day 7–13. (6)

2.2 Some contraceptive pills contain a high dose of progesterone.

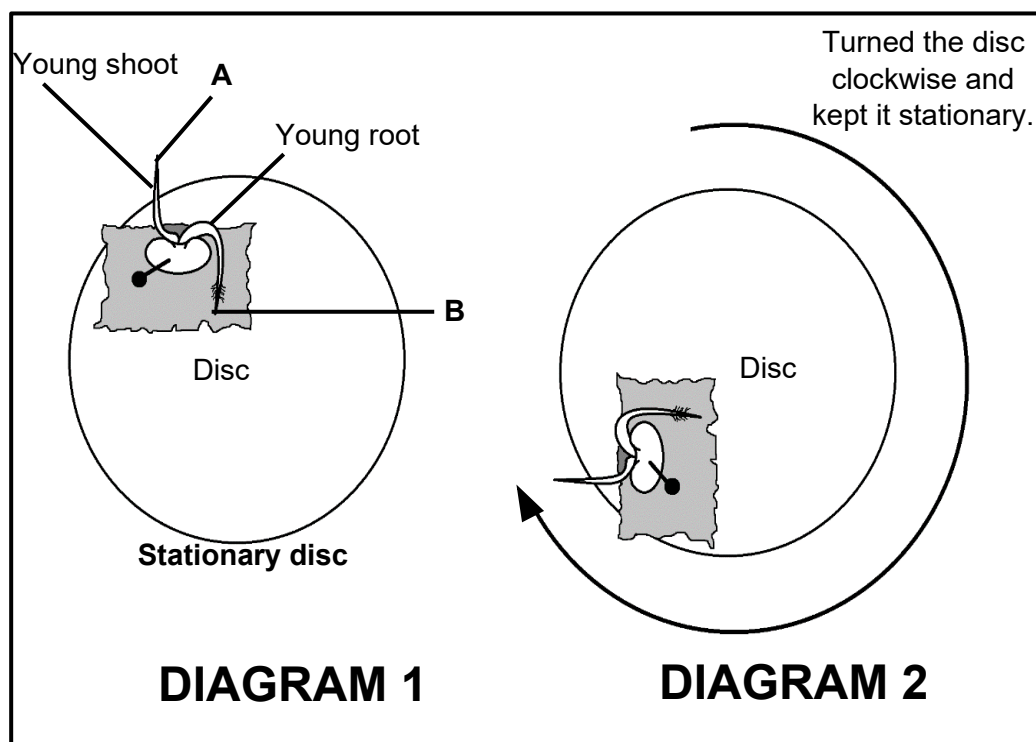
Explain why a woman using this kind of pill will not fall pregnant. (4)

2.3 Describe *oogenesis*. (5)

2.4 An investigation was conducted to determine the influence of an external stimulus on the direction of growth in plants.

The procedure was as follows:

- A germinating seedling was pinned onto a wet tissue on a disc as shown in the diagram.
- The disc was placed in a vertically upright position in a dark room.
- The seedlings were gently sprayed with water daily.
- After 4 days, the disc was turned to the position shown in **DIAGRAM 2**. It was kept vertically upright and stationary.
- After a week, observations were made and the direction of growth in the young stem and root was recorded.



2.4.1 State the pattern of distribution of the growth hormone at:

(a) **A** (1)

(b) **B** (1)

2.4.2 Explain ONE reason why the disc was kept in a dark room. (2)

2.4.3 Draw a neat diagram to show the direction of growth of the young shoot and root in DIAGRAM 2, after a week. (3)

2.4.4 Explain the direction of growth of the young root after it was placed in the position shown in DIAGRAM 2. (7)

2.5 The salt concentration in the blood is controlled by aldosterone.

2.5.1 Name the gland that secretes aldosterone. (1)

2.5.2 State the system of the body that the gland is part of. (1)

2.5.3 A person consumes a meal with a high salt content.

Explain the change in the:

(a) Level of aldosterone in the blood of the person (3)

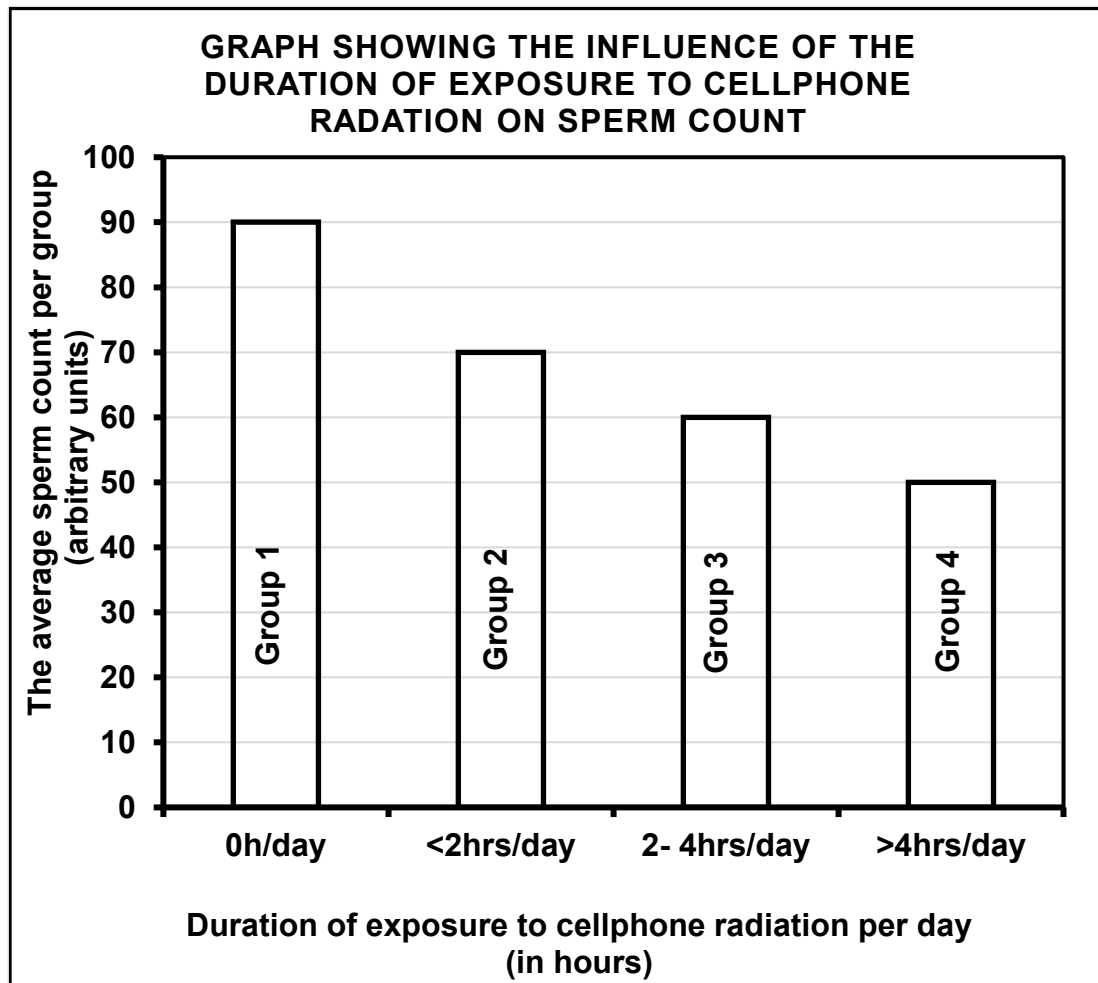
(b) Composition of urine (2)

2.6 An investigation was conducted to determine the effect of the duration of exposure to cellphone radiation on sperm count.

The procedure was as follows:

- 100 healthy, non-smoking male volunteers who do not drink alcohol were selected
- The participants were:
 - Divided into 4 equal groups according to the amount of time they use their cellphones per day
 - Given the same type of cellphones to use
 - Instructed to wear loose under garments for a week before the collection of semen
- Semen was collected individually from the participants in each group
- The average sperm count of each group was determined
- The procedure was repeated every 2 months for a year

The result of the investigation is shown in the graph below.



2.6.1 Identify the:

(a) Independent variable (1)

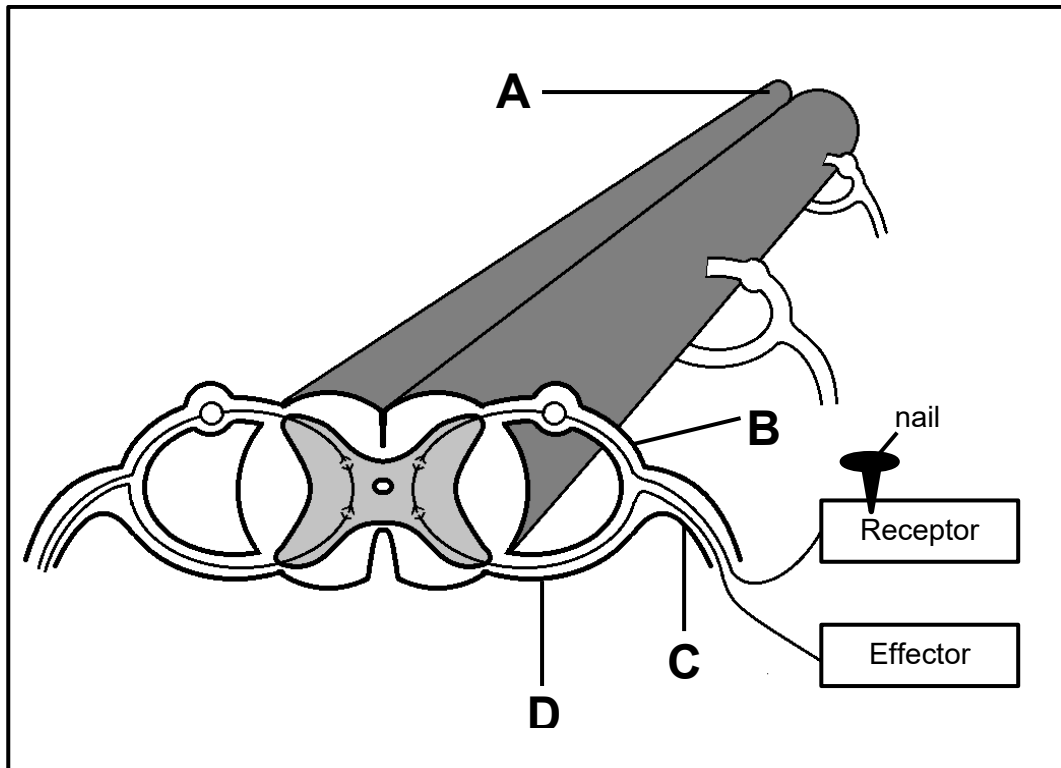
(b) Dependent variable (1)

- 2.6.2 How many times in a year did they test semen samples from each group of participants? (1)
- 2.6.3 State ONE way in which the investigator ensured reliability of this investigation. (1)
- 2.6.4 State THREE variables that should have been kept constant to improve the validity of this investigation. (3)
- 2.6.5 Use the results from the graph to draw a conclusion for this investigation. (2)
- 2.6.6 Give a reason for instructing all the participants to wear loose under garments a week before the collection of semen. (2)

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QUESTION 3

3.1 The diagram shows a reflex arc.



3.1.1 Give the LETTER that represents the central nervous system. (1)

3.1.2 A person stepped on a nail with his foot and immediately withdrew it.

Describe the path of the reflex action from the moment he stepped on the nail until he pulled his foot away. (5)

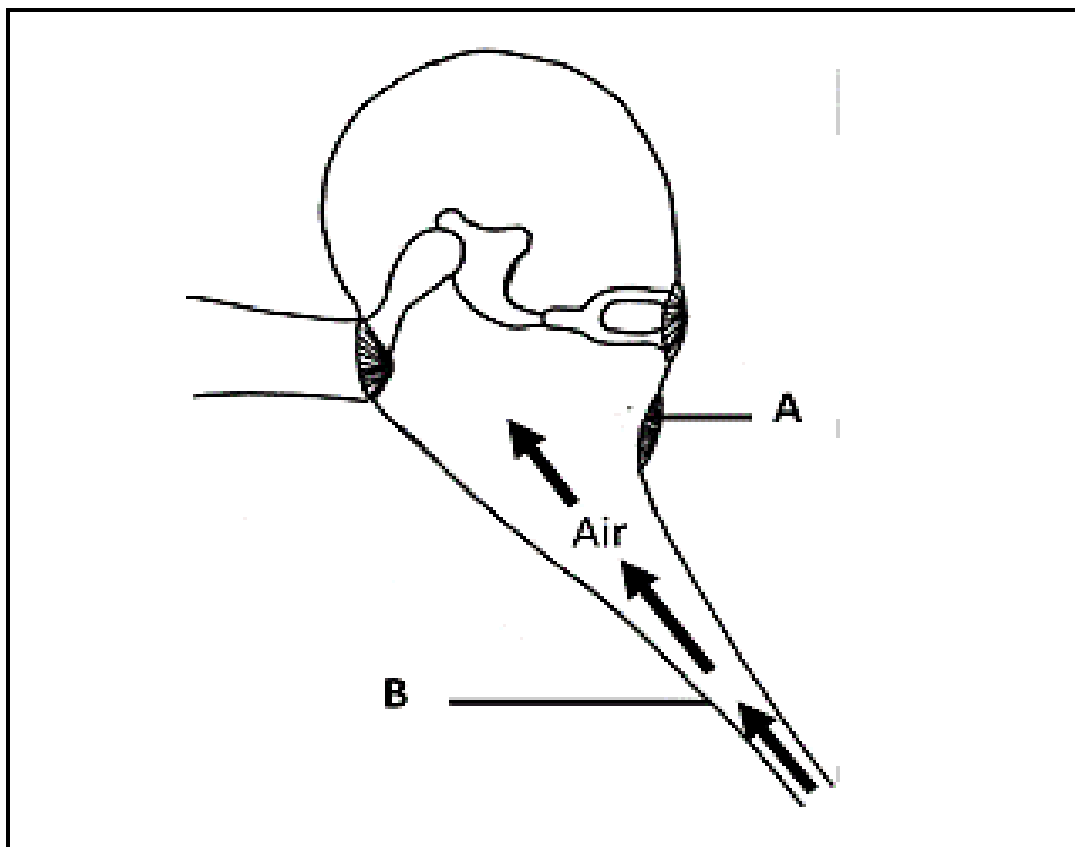
3.1.3 In the diagram above, **A**, **B**, **C** and **D** represent different regions of a human nervous system.

In a car accident different people obtained different nervous system injuries. At the hospital the doctor used a blunt object to gently scrape the soles of the feet of each patient to test for nerve damage.

Write the correct LETTER only, for each statement below to indicate the damaged region of the nervous system.

- (a) The patient can feel the scraping but cannot move his feet. (1)
- (b) The patient cannot feel the scraping, but is able to move his feet. (1)
- (c) The patient can neither feel the scraping nor move his feet (1)
- (d) The patient cannot feel the scraping or move his upper and lower limbs. (1)

3.2 The diagram below represents the human middle ear.



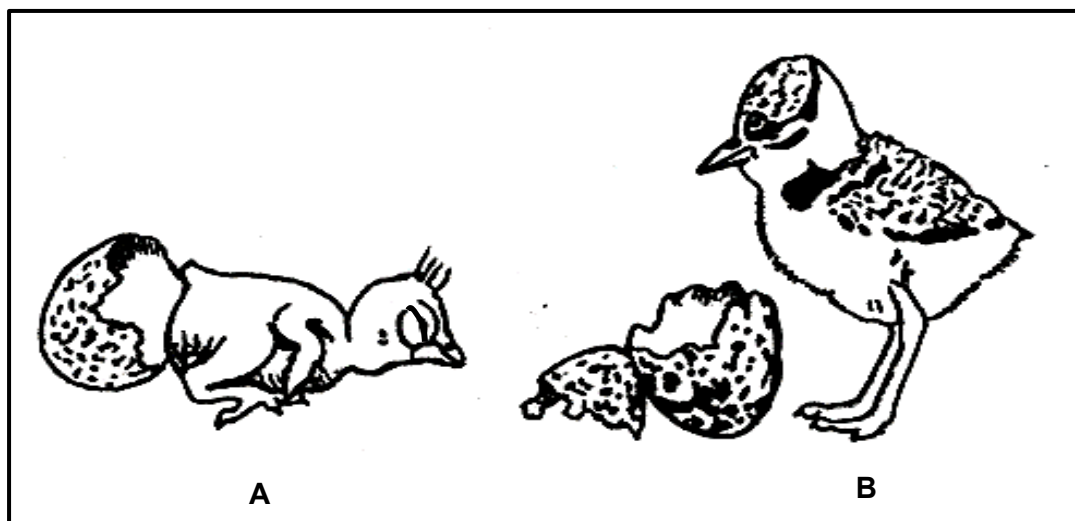
3.2.1 State the function of part **A**. (1)

3.2.2 Describe the pathway of a sound stimulus AND the role of relevant structures from the tympanic membrane to the cerebrum. (7)

3.2.3 From which part of body does air move into the middle ear? (1)

3.2.4 Explain why air is pushed into the middle ear through the tube **B** when air pressure outside the body increases. (4)

3.3 The diagram below represents two hatchlings soon after hatching.

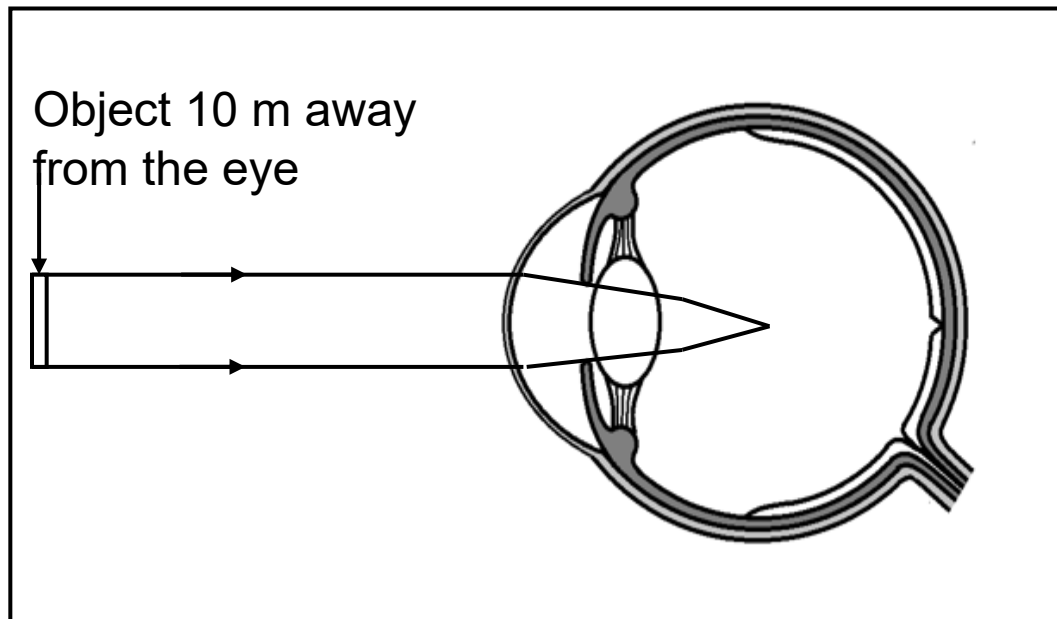


3.3.1 Name the type of development shown in **A**. (1)

3.3.2 Give ONE observable reason for your answer to QUESTION 3.3.1. (1)

3.3.3 Explain THREE features of precocial birds that enable them to survive in their habitat. (6)

- 3.4 The diagram below represents an eye of a person with short-sightedness.



- 3.4.1 Name the structure of the eye that bends the light the most. (1)
- 3.4.2 Give TWO structural defects of the eye that cause short-sightedness as seen in the diagram. (2)
- 3.4.3 Describe the visual ability of a person who suffers from short-sightedness. (2)
- 3.4.4 Name the type of lens used to correct the visual defect. (1)

- 3.4.5 The table below shows the occurrence of short-sightedness amongst 12-year-old children in five countries.

NAME OF COUNTRY	12-YEAR-OLD CHILDREN WITH SHORT-SIGHTEDNESS (%)
Singapore	62
Hong Kong	53
China	50
United States of America	20
India	10

Draw a bar graph to represent the data in the table.

(6)

- 3.5 A person was stranded in a desert without water. He had to walk a long distance to seek assistance. He was very thirsty and dehydrated due to excessive sweating.

Describe the homeostatic mechanism that maintains the correct level of water in his blood.

(7)

[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150