education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P1

SEPTEMBER 2024

MARKS: 150

TIME: 2½ hours

This paper consists of 15 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 your 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 for 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 answer and write only the letter (A–D) next to the question numbers (1.1.1 to 1.1.9.) in the ANSWER BOOK, e.g. 1.1.10 D.

1.1.1 The photoreceptor/s stimulated by dim light is/are …

A rods and lenses.
B rods and cones.
C rods only.
D cones only.

1.1.2 The receptor/s in the inner ear that are sensitive to the position of the body is/are the …

A maculae.
B cristae.
C maculae and cristae.
D ampulla.

1.1.3 The nerves that link receptor and effector organs with the brain and spinal cord are …

A spinal nerves.
B cranial nerves.
C peripheral nerves.
D olfactory nerves.

1.1.4 A treatment for a middle ear infection is …

A cochlear implants
B hearing aids
C tympanic transplant
D grommets

1.1.5 An under-secretion of ADH in a patient leads to …

A a high concentration of sodium in the urine.
B the formation of a large volume of urine.
C the presence of glucose in the urine.
D decreased thirst.

1.1.6 Which ONE of the following is a response of the human body when adrenalin is released?

A Increased conversion of glycogen to glucose.
B Decreased oxygen intake.
C Increased blood flow to the intestine.
D Decreased blood flow to the muscle and heart.

1.1.7 A person experiences the following symptoms:

- Loss of weight
- Is always hungry
- Never feels cold

The explanation for this combination of symptoms is that the person …

A secretes too much growth hormone.
B is diabetic and just had an insulin injection.
C has an underactive hypothalamus.
D has an overactive thyroid gland.

1.1.8 ONE of the functions of the hormone progesterone is to …

A speed up the development of the follicles.
B maintain the uterine wall for implantation of the embryo.
C bring about the formation of the corpus luteum.
D stimulate the secretion of sweat.

1.1.9 The pituitary gland is located …

A below the hypothalamus.
B above the cerebellum.
C behind the cerebrum.
D in front of the thyroid. (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 1.2.7) in the ANSWER BOOK.

1.2.1 The ability of the lens of the eye to alter its shape for sharp vision

1.2.2 A disease caused by damage to the myelin sheath of the neurons, characterised by physical and mental disabilities

1.2.3 The maintenance of a constant internal environment in the human body

1.2.4 The glands that pour their secretions directly into the bloodstream

1.2.5 Control of the level of water in the body

1.2.6 The hormone responsible for stimulating milk production

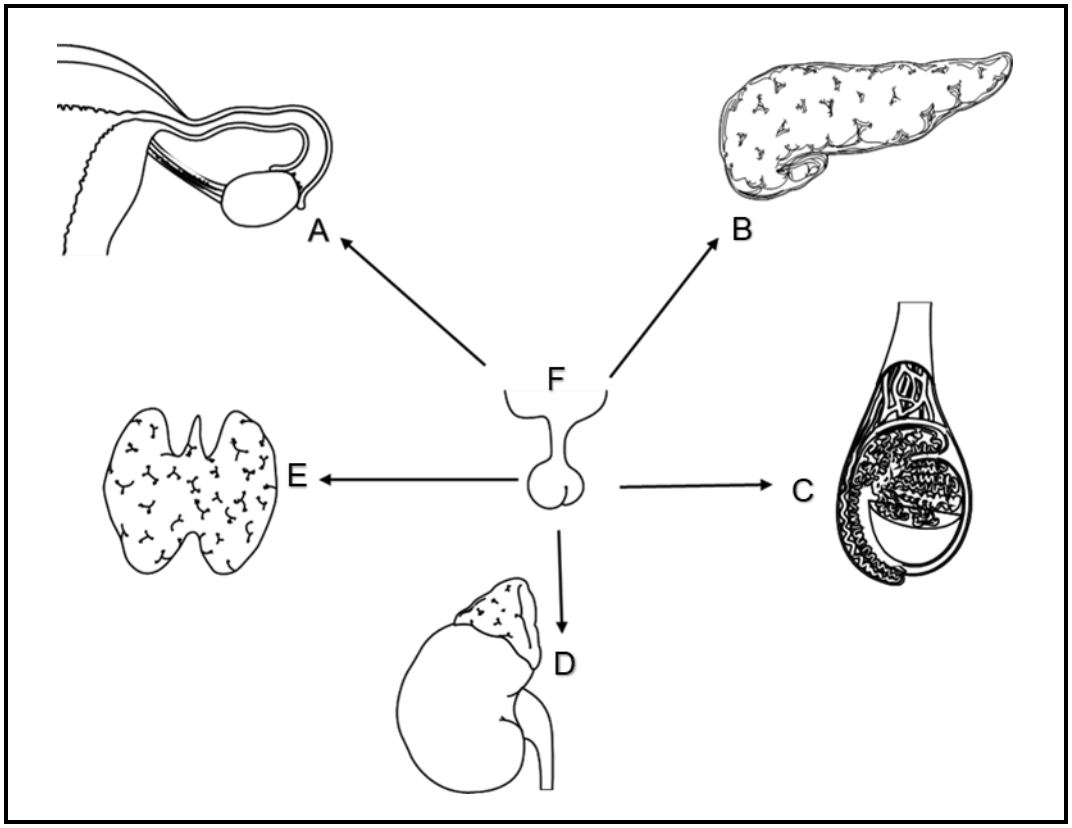
1.2.7 A decrease in the internal diameter of blood vessels which decreases blood flow (7 x 1) **(7)**

1.3 Indicate whether each of the 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 numbers (1.3.1 to 1.3.3) in the ANSWER BOOK.

COLUMN I		COLUMN II	
1.3.1	The ability to see objects close by, but not objects far away	A: B:	Long-sightedness Short-sightedness
1.3.2	The area in the retina that contains the highest number of cones and no rods	A: B:	Blind spot Yellow spot
1.3.3	A neuron that links one neuron with the next inside the central nervous system	A: B:	Sensory neuron Motor neuron

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

1.4 The diagram below shows organs involved in the endocrine systems.



Give the LETTER and NAME of the gland/hormone that:

1.4.1 Influence height, building bones and muscles (2)

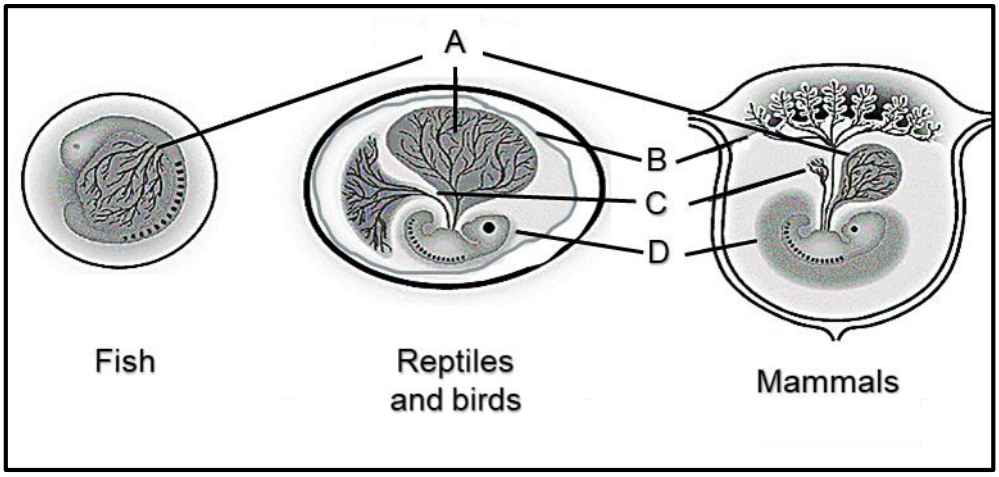
1.4.2 Serves as both endocrine and exocrine gland (2)

1.4.3 Secrete hormones responsible for pregnancy (2)

1.4.4 Secrete a hormone that when imbalanced causes a goitre (2)

1.4.5 Controls secondary sexual characteristics in males (2)
(10)

1.5 The diagram below shows an amniotic egg of different organisms.



1.5.1 What is precocial development? (1)

1.5.2 Give the function of the part labelled **B**. (1)

1.5.3 Name the organism without allantois. (1)

1.5.4 Give the LETTER and NAME of the part that provides nutrients to the embryo. (2)

1.5.5 Name the part that provides mechanical support for the embryo. (1)

1.5.6 Identify ONE organism that:

(a) Undergo external fertilization (1)

(b) Have parental care (1)

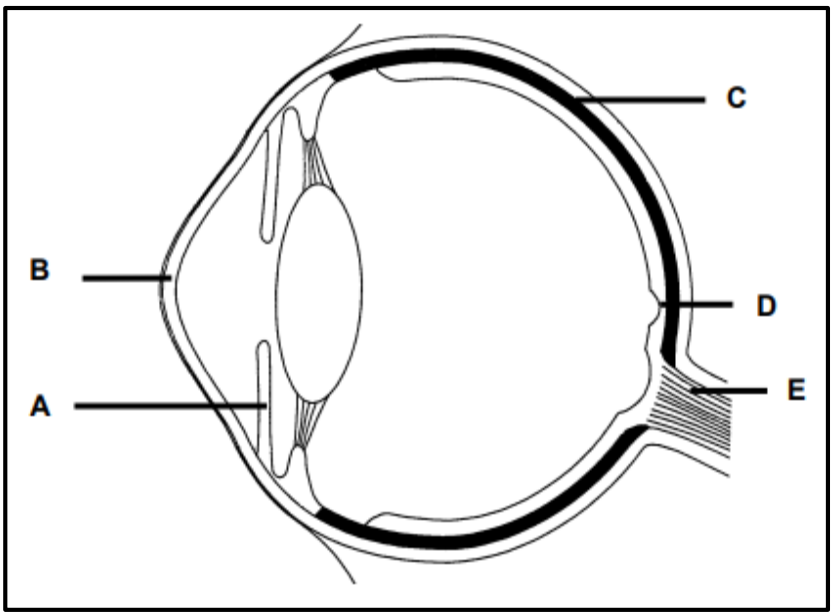
(c) Are viviparous (1)
(9)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The diagram below represents the internal structure of the human eye.



2.1.1 Identify and give ONE function for each of the following structures:

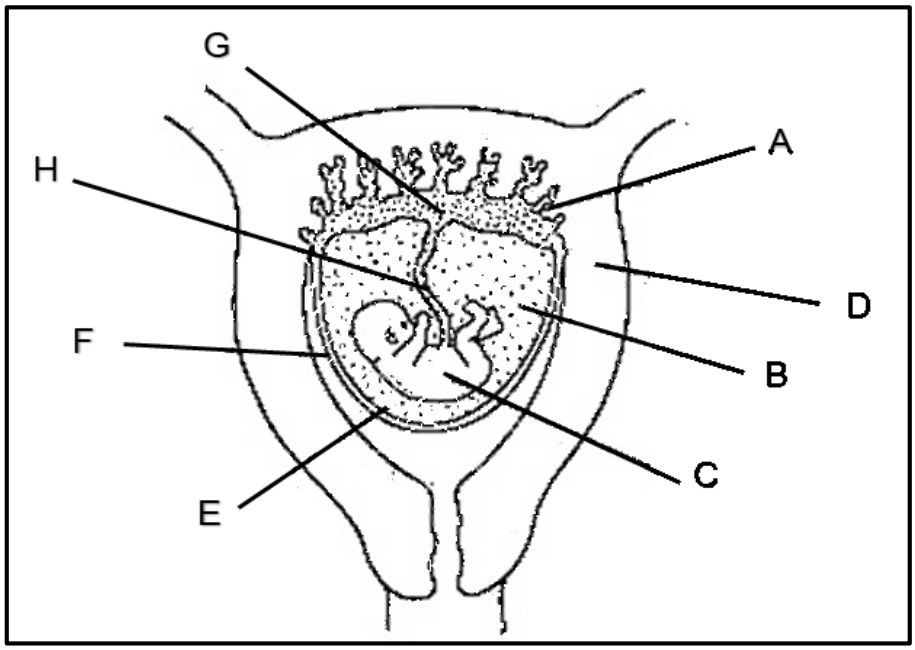
(a) **A** (2)

(b) **E** (2)

2.1.2 What treatment is prescribed if part **B** has an uneven surface? (1)

2.1.3 Describe the pupillary mechanism when eyes are exposed to bright light. (4)
(9)

2.2 The diagram below illustrates the human foetus in the uterus.



2.2.1 Name:

(a) The process by which the blastocyst is attached to the uterine wall (1)

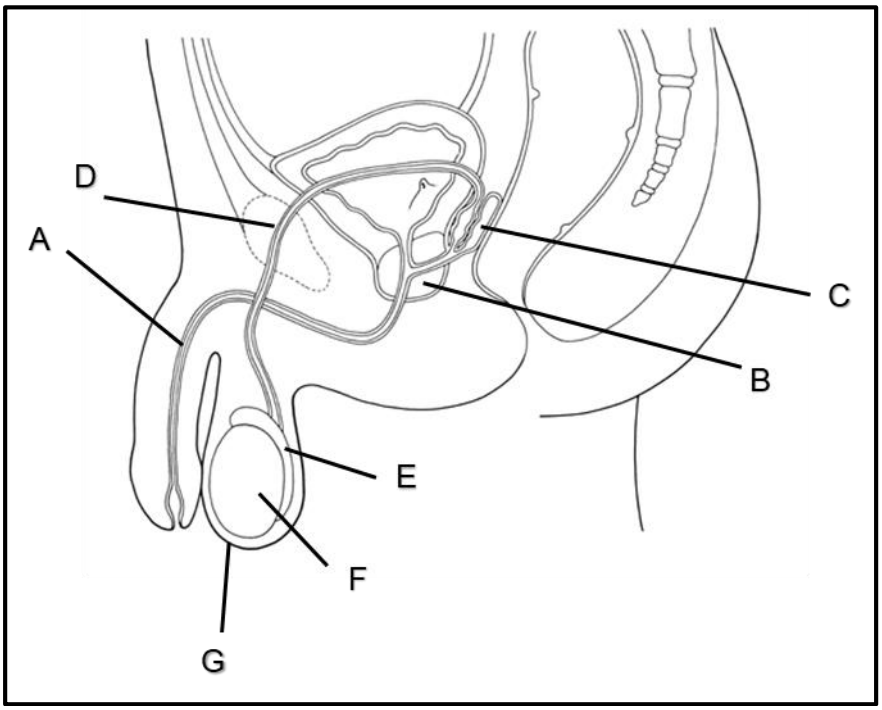
(b) The period during which the foetus develops in the uterus (1)

2.2.2 Describe the stages of development of a zygote after fertilization. (3)

2.2.3 Describe the effect on the foetus if the liquid in part **B** is NOT enough during the developmental stages. (4)

2.2.4 Explain TWO functions of the blood vessels in the umbilical cord during the developmental stages. (4)
(13)

2.3 The diagram below represents a male reproductive system.



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

2.3.2 Give the NAME of the part responsible for the following:

(a) Produces sperms (1)

(b) Temporary storage of sperms (1)

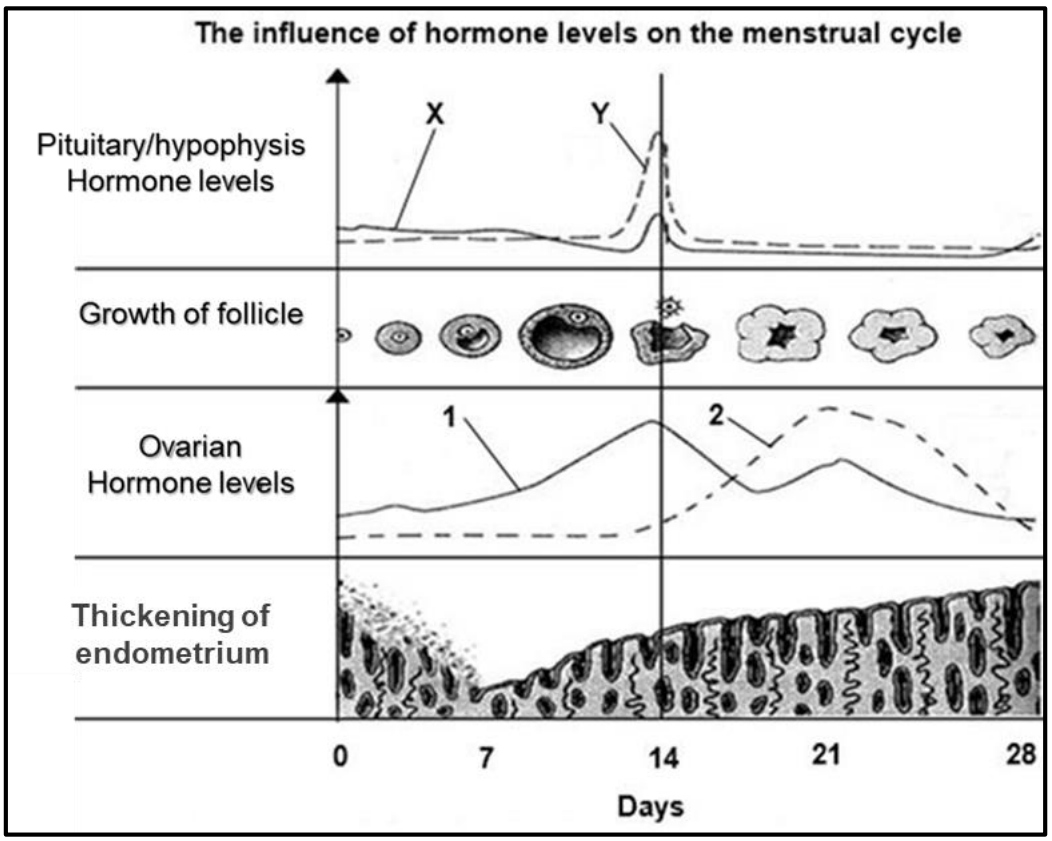
(c) Transport of semen to the ejaculatory duct (1)

2.3.3 Explain the consequences on fertility if part **G** is exposed to high temperatures daily. (4)

2.3.4 Tabulate TWO differences between spermatogenesis and oogenesis in humans. (5)

2.3.5 Draw a labelled diagram to represent the structure that fuses with the sperm cell to form a zygote. (4)
(17)

2.4 The graph below shows the menstrual cycle and the influence of different hormones on the blood of a mature woman over a 28-day cycle.



2.4.1 From the graph, state:

(a) On which day ovulation takes place (1)

(b) Between which days menstruation take place (1)

2.4.2 Give ONE visible reason from the graph for your answer to QUESTION 2.4.1(b). (2)

2.4.3 Explain why the progesterone levels must increase as shown on the graph during the cycle. (2)

2.4.4 Describe the relationship of oestrogen and the endometrium in the uterus during days 7 to 14 of the cycle. (2)

2.4.5 (a) Did fertilisation take place during the 28-day cycle as illustrated in the graph? (1)

(b) Explain your answer to QUESTION 2.4.5(a). (2)

(11)
[50]

QUESTION 3

3.1 The Grade 12 learners investigated the effect of abscisic acid on plant dormancy.

The procedure was as follows:

- A greenhouse was set up with a constant temperature of 28 °C and a 30% humidity level.
- 16 pear trees of similar age and size were placed in the greenhouse.
- The trees were divided into group **A** and group **B** with 8 trees in each group.
- In group **A**, the 8 trees were treated with abscisic acid for 5 days.
- In group **B**, the 8 trees were treated with water only for 5 days.
- The shedding of leaves by the plants was observed.
- The learners recorded their observations for seven days.

The diagram below shows the observation made at the end of the seven days.

The diagram does NOT represent all the trees that were investigated nor the actual size of the trees.



Group A **Group B**

3.1.1 State the aim of the investigation. (1)

3.1.2 Identify the following:

(a) Independent variable (1)

(b) Dependent variable (1)

(c) ONE controlled variable (1)

3.1.3 What is meant by abscission? (1)

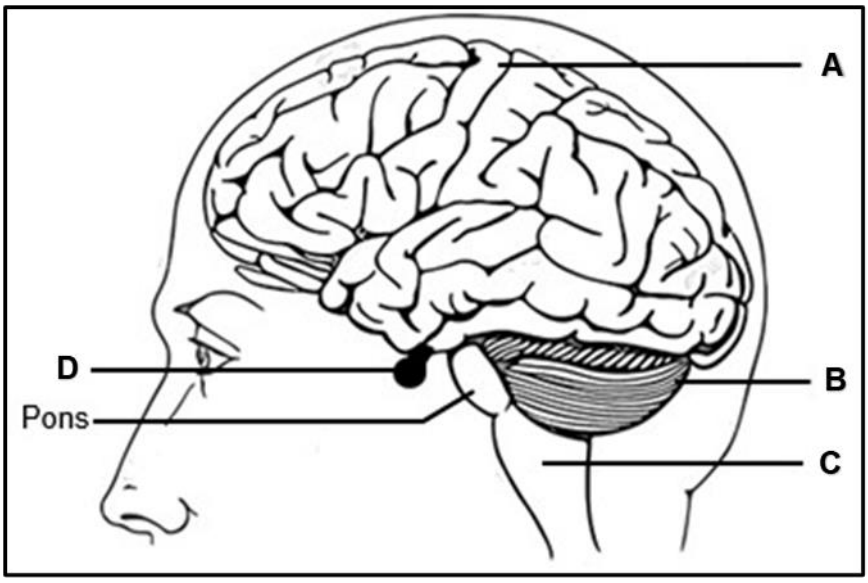
3.1.4 State TWO other functions of abscisic acid in plants. (2)

3.1.5 State TWO ways in which the learners could have made their results more reliable. (2)

3.1.6 As a follow up the learners changed the temperature of the greenhouse to 40 °C.

Explain the effect of the change in temperature on the results of the investigation. (2)
(11)

3.2 The diagram below represents the human brain.



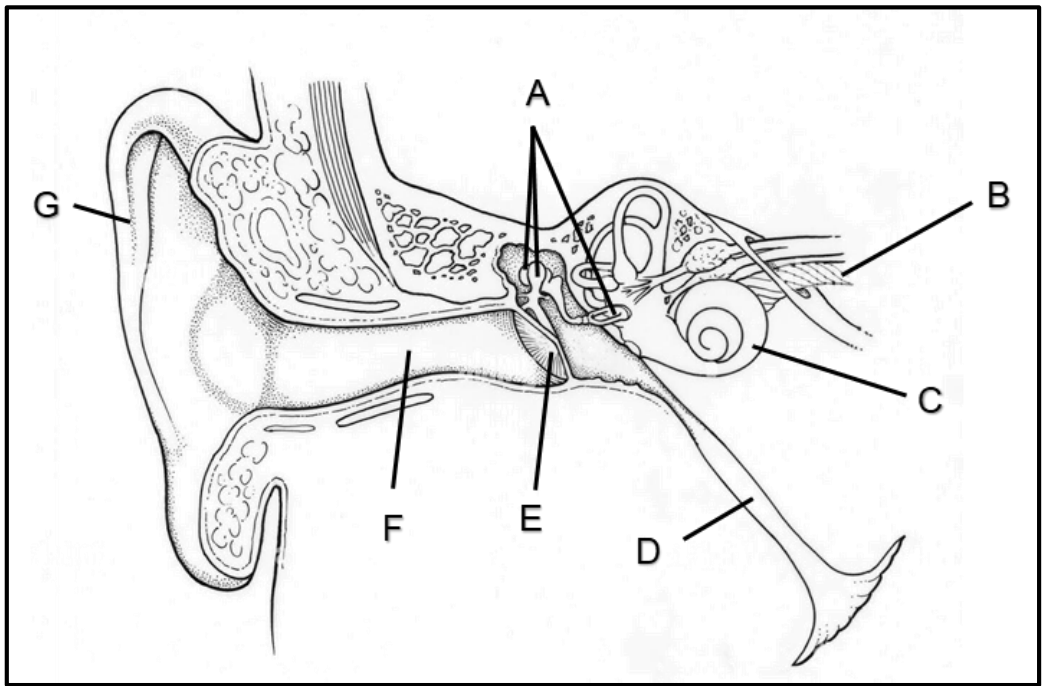
3.2.1 Identify the part labelled **B** and give its function. (2)

3.2.2 Identify the part of the brain that receives impulses from the optic nerve. (1)

3.2.3 Name part **C**. (1)

3.2.4 Describe how balance and equilibrium are maintained by the ear when a person changes their speed and direction of movement. (6)
(10)

3.3 The diagram below shows the cross-section of the human ear.



3.3.1 Identify parts **A** and **F**. (2)

3.3.2 Identify passage **D** and state its function. (2)

3.3.3 Give the pathway (in LETTERS) of hearing in the human ear. (2)

3.3.4 Explain the function of part **E** in the process of hearing. (2)

3.3.5 Explain what would happen to the ability to hear if part **C** is damaged. (4)
(12)

3.4 3.4.1 Explain how the process of vasodilation in the skin contributes to thermoregulation. (4)

3.4.2 Describe the role of vasodilation and sweating in thermoregulation. (3)
(7)

3.5 Read the extract below on the effect of alcohol on the brain's communication pathways.

> Alcohol consumption can interfere with brain communication pathways and affect its appearance and function. It can make it more difficult for the brain to control balance, memory, speech and judgement. This leads to a higher likelihood of injuries and other negative outcomes.
>
> Neurons can shrink because of long-term heavy drinking. Alcohol blocks chemical signals between brain cells, leading to immediate intoxication symptoms, including impulsive behaviour, slurred speech, poor memory and slowed reflexes. Heavy drinking over a long time can make the brain respond more dramatically to certain brain chemicals. This can lead to painful and potentially dangerous withdrawal symptoms that damage brain cells.
>
> Excessive alcohol use can cause chemical and molecular modifications in the brain, causing a decrease in overall brain volume, specifically within the frontal lobe/prefrontal cortex, cerebellum and hippocampus (a complex brain structure embedded deep in the temporal lobe). Alcohol destroys brain cells, contracts brain tissue and also damages the liver and pancreas.

3.5.1 What is the hippocampus? (1)

3.5.2 Identify the part of the brain that:

(a) Controls memory, speech and judgement (1)

(b) Controls the concentration of carbon dioxide in the body (1)

3.5.3 Give ONE effect of long-term heavy drinking. (1)

3.5.4 Explain the consequences of the answer to QUESTION 3.5.3. (2)

3.5.5 State the disease that is caused by the damage of the nerve tissues within the brain. (1)

3.5.6 Explain the effect of alcohol on the functioning of the pancreas in controlling the blood glucose level. (3)

(10)
[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150

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