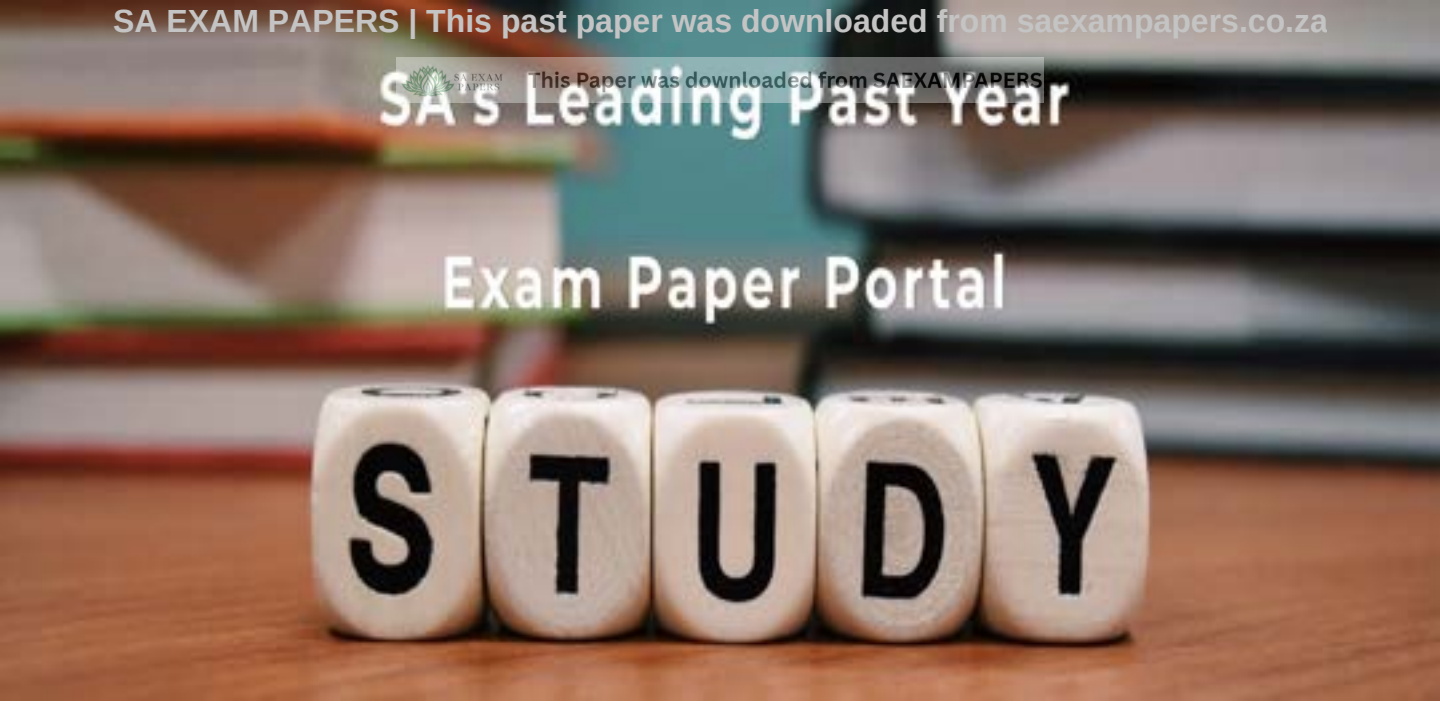


education

MPUMALANGA PROVINCE
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P2

SEPTEMBER 2025

MARKS: 150

These marking guidelines consist of 13 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 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 answer and write only the letter (A to D) next to the question number (1.1.1 to 1.1.10) in the ANSWER BOOK, for example 1.1.11 D.

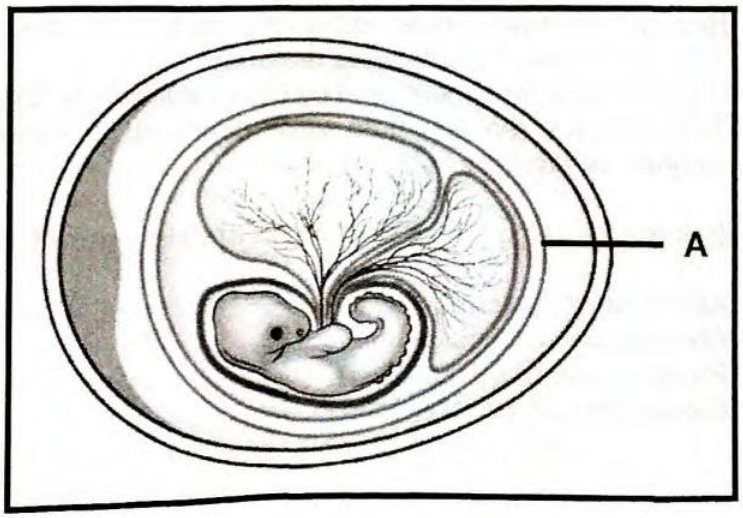
1.1.1 Which of the following involves the development of the young inside the uterus of the mother, where it receives nutrients through the placenta?

A Ovipary
B Ovovivipary
C Vivipary
D Amniotic egg

1.1.2 Sperm cells in humans are temporarily stored:

A Ovary
B Epididymis
C Vas deferens
D Prostate gland

1.1.3 The diagram below shows a stage of gestation



One of the functions of part **A** is to …

A serve as a reserve food supply.
B give rise to the placenta.
C prevent the developing foetus from moving about.
D enclose the fluid that protects the embryo against injury.

1.1.4 Which ONE of the following are functions of adrenalin?

A Influences the pupil size and controls the amount of water lost by the body through the kidneys.
B Increases the blood sugar level and blood pressure.
C Decreases metabolic rate and blood sugar level.
D Affects growth and increases muscle tone.

1.1.5 An investigation was done to determine the effect of alcohol on the reaction time of a person.

Reaction time was measured by the time it took to catch a ruler.

The procedure was as follows:

- The person's reaction time was first measured in a room with bright light.
- The person was then given 200 mℓ of alcohol to drink.
- After 15 minutes the reaction time of the person was measured for the second time while he/she was in a room with dim light.
- Ten measurements were recorded each time, and an average was calculated.

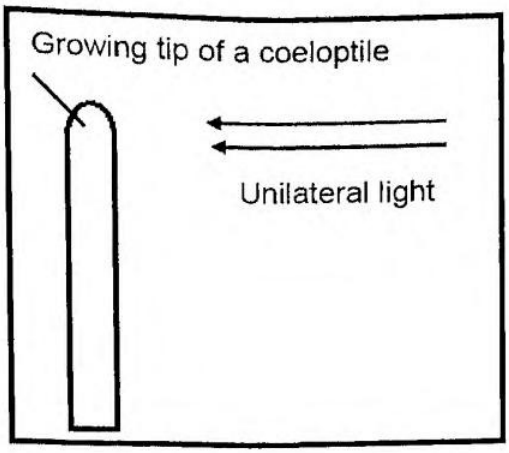
How was the validity of the investigation decreased?

A Reaction time was measured in different light conditions.
B Only ten measurements were recorded.
C Reaction time was measured by the time it took to catch a ruler.
D The person's reaction time was measured in the absence of alcohol the first time.

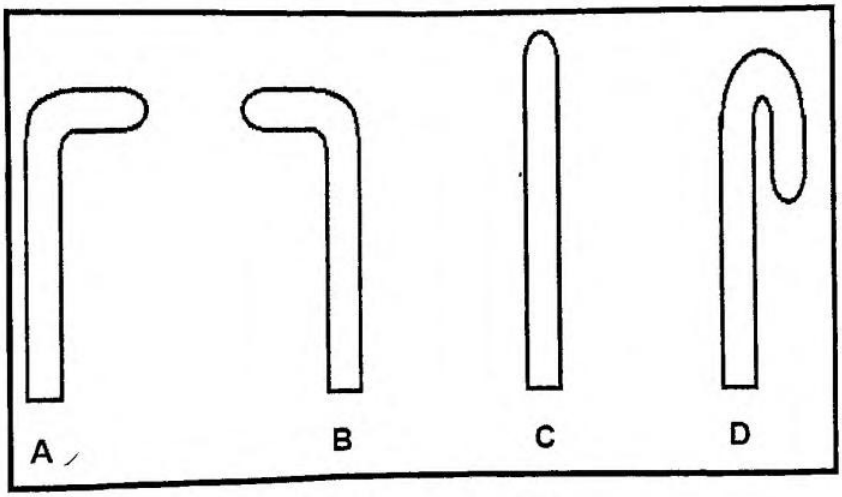
1.1.6 Which of the following pair combinations are plant growth hormones?

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

1.1.7 The diagram below represents a growing tip of a coleoptile (young plant shoot) exposed to unilateral light.



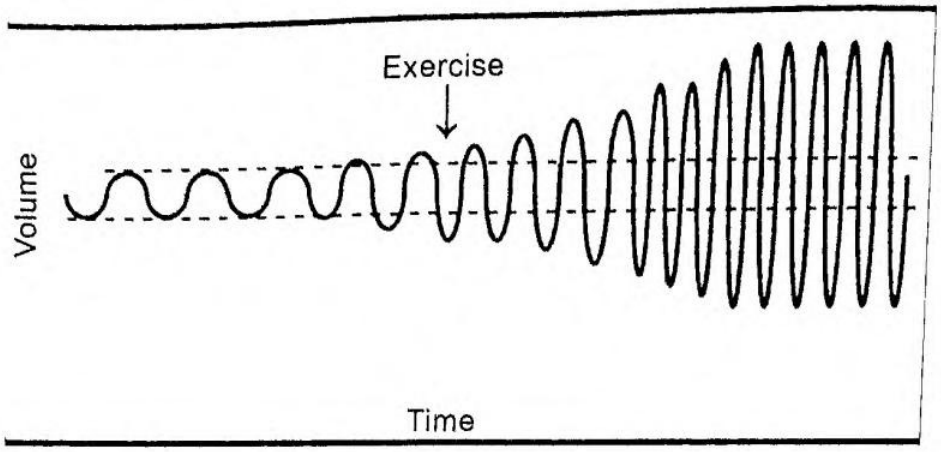
Which ONE of the following diagrams **A**, **B**, **C** or **D** correctly represents the direction of growth of the coleoptile after a week?



1.1.8 During periods when the temperature is high, ...

A the aldosterone levels are expected to be low.
B the blood vessels on the skin dilate.
C the adrenalin levels are expected to be high.
D sweating decreases.

QUESTIONS 1.1.9 and 1.1.10 are based on the graph below which is known as a spirometer trace and is used to determine the volume of air a person inhales and exhales, as well as their breathing rate (the number of breaths over a period of time).



1.1.9 The spirometer trace shows that exercise causes the ...

A breathing rate to increase while breathing depth decreases.
B breathing rate to decrease while breathing depth increases.
✓C breathing rate and breathing depth to increase.
D breathing rate to increase while breathing depth remains constant.

1.1.10 Which of the following is responsible for the change in the spirometer trace during exercise?

✓A Increased energy required by muscle cells
B Decrease in the carbon dioxide levels in blood
C Decreased respiration in muscle cells
D Increase in the pH levels of blood

(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 hormone which is responsible for development of secondary sexual characteristics in males

1.2.2 Cyclical events taking place in the ovary

1.2.3 Coiled tubular structure that stores sperm

1.2.4 The increase of the internal diameter of blood vessels so that more blood flows through them

1.2.5 The growth response of a plant to in response to an external stimulus

1.2.6 A hormone that stimulates the mammary glands to produce milk

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

1.2.8 The hormone secreted by the thyroid gland that controls the metabolic rate

1.2.9 The part of the peripheral nervous system that controls involuntary actions

1.2.10 The secretions that are produced in small quantities by the endocrine glands

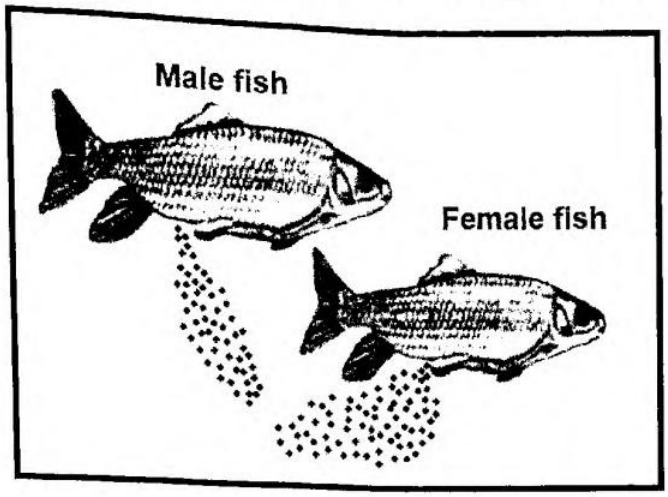
(10 x 1) **(10)**

1.3 Indicate whether each of the statements 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 number (1.3.1 to 1.3.4) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	Receptor in the ear that detects position of the head in space	A: Organ of Corti B: Rods
1.3.2	Defence mechanism in plants	A: Leaves B: Thorns
1.3.3	A Hormone that stimulates an increase in the blood glucose level	A: Insulin B: Glycogen
1.3.4	The human pancreas functions as	A: Endocrine gland B: Exocrine gland

(4 x 2) **(8)**

1.4 The diagram below represents a reproductive strategy in a fish species.



1.4.1 Name the type of fertilisation shown in the above diagram. (1)

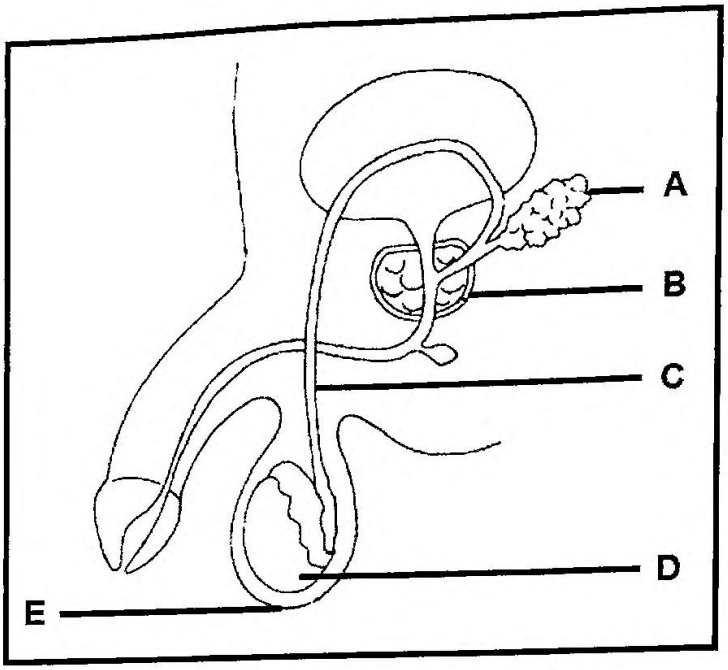
1.4.2 Name the type of reproductive strategy used by the fish as shown in the diagram above. (1)

1.4.3 State TWO visible ways in which the chances of fertilisation are increased. (2)

1.4.4 Explain why there is no need for the fish eggs to be covered with a hard or leathery shell. (2)

(6)

1.5 The diagram below represents parts of the human male reproductive system.



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

1.5.2 Describe the common function of parts **A** and **B**. (2)

1.5.3 Name the type of gametogenesis taking place at **D**. (1)

1.5.4 Test results show that a man has a low sperm count.

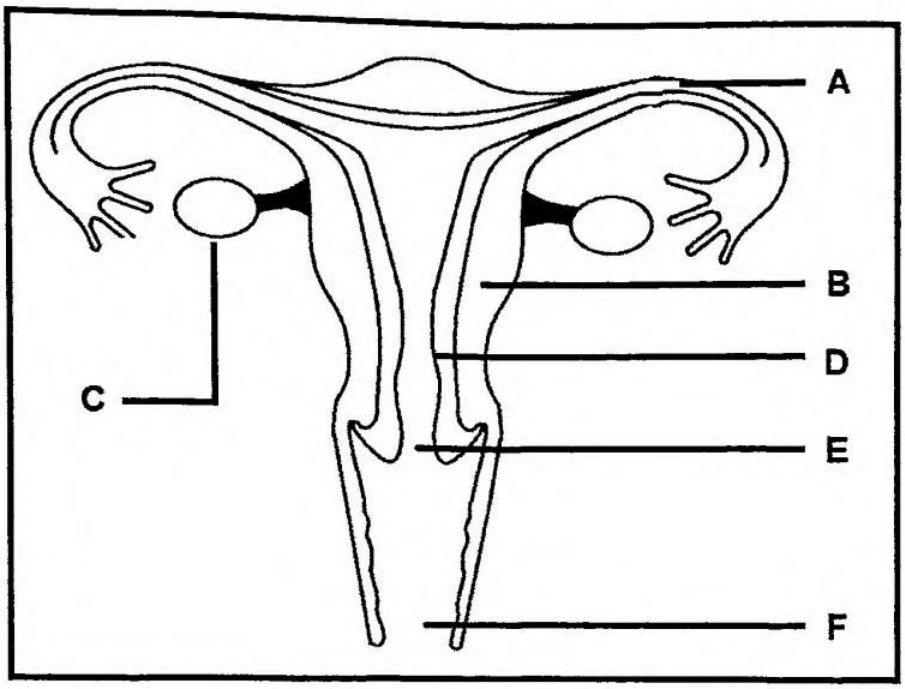
Explain why the doctor would advise the man not to put his laptop on his lap. (2)
(6)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The diagram below represents parts of the human female reproductive system.



2.1.1 Give the LETTER and NAME of the part, where sperms are deposited during copulation. (2)

2.1.2 Name the cell formed after the ovum and sperm have fused? (1)

2.1.3 State TWO functions of part **B**? (2)

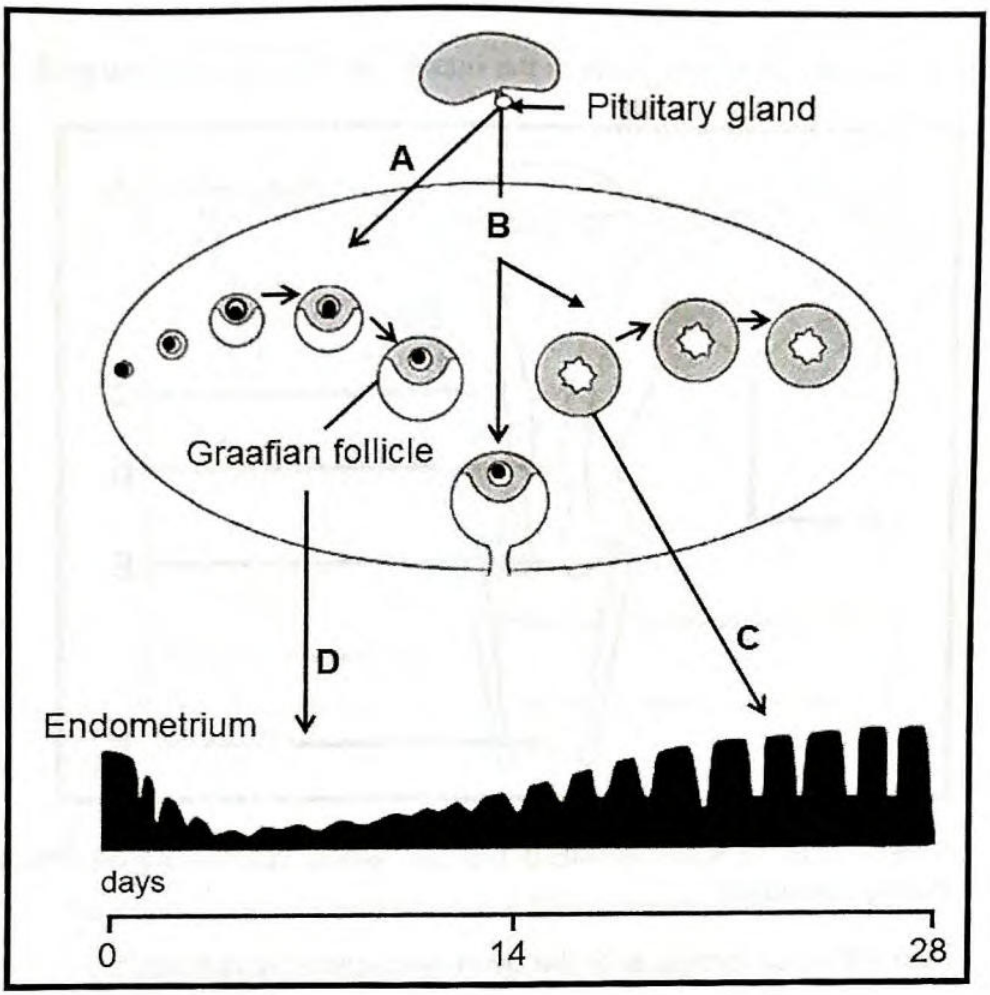
2.1.4 Name the reproductive hormone responsible for the release of the ovum. (1)

2.1.5 Explain what happens to part **D** if fertilisation does not occur. (2)

2.1.6 Explain how cutting and tying of part **A** on both sides prevent fertilisation from taking place? (2)

2.1.7 Make a labelled drawing of the gamete released from part **C**. (3)
(13)

2.2 The diagram below represents some changes that occur in the human female body during the menstrual cycle. The letters A to D represent hormones.

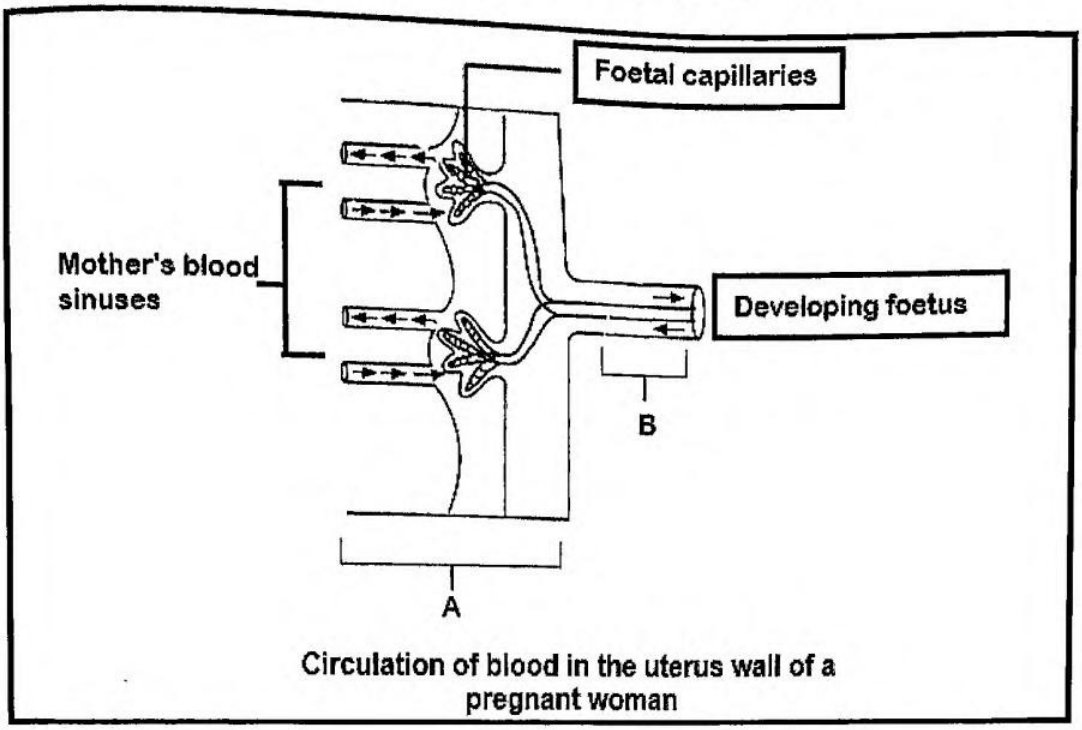


2.2.1 Identify hormone **D**. (1)

2.2.2 On which day of the cycle did ovulation take place? (1)

2.2.3 Explain the negative feedback mechanism between hormones **A** and **C** if fertilisation occurs. (5)
(7)

2.3 The diagram below illustrates the circulation of blood in the uterus wall of a pregnant woman. The arrows show the direction of blood flow.



Circulation of blood in the uterus wall of a pregnant woman

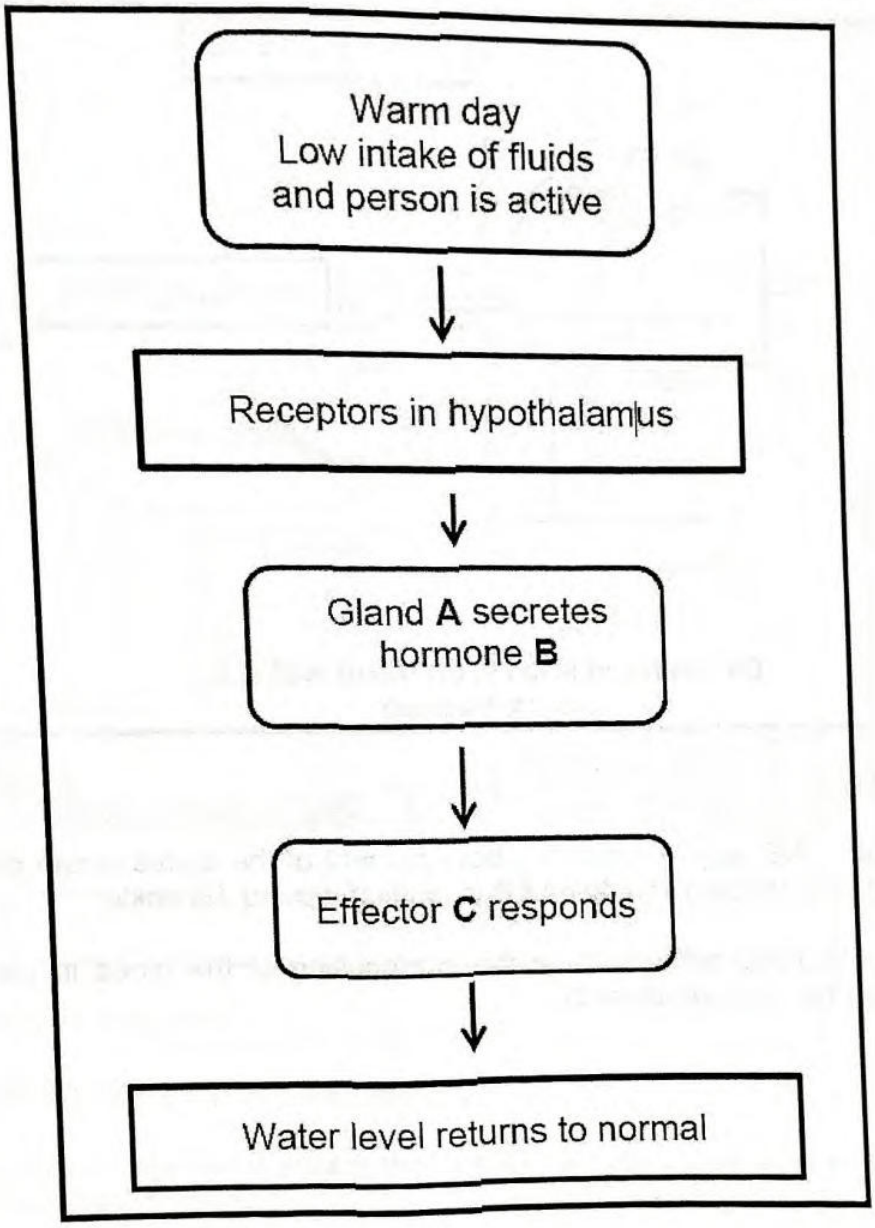
2.3.1 Identify **A**. (1)

2.3.2 Explain ONE way in which the development of the foetus would be negatively affected should part **B** is tangled around the ankle. (2)

2.3.3 Tabulate TWO differences in the composition of the blood in the vessels found in structure **B**. (5)

(8)

2.4 The flow diagram below represents osmoregulation in the human body.



2.4.1 Define osmoregulation. (2)

2.4.2 Name the organ responsible for osmoregulation? (1)

2.4.3 Identify:

(a) Hormone **B** (1)

(b) Gland **A** (1)

2.4.4 Explain why a person may dehydrate if a tumour on gland **A** develops. (5)
(10)

2.5 An oral glucose tolerance test is used to determine if a person is diabetic.

After a period of fasting (no food intake) the person drinks a glucose solution. The person's blood glucose levels are then measured at regular intervals.

The normal blood glucose level in the blood is 90mg/100ml.

If the person's blood glucose level is above 200mg/100ml two hours after drinking the glucose solution then the patient is diagnosed as being diabetic.

The results of a glucose tolerance test performed on three different patients (**1**, **2** and **3**) is provided in the table below.

Time (minutes)	Blood glucose levels (mg/100ml)		
	Patient 1	Patient 2	Patient 3
0(glucose solution is ingested)	85	130	100
30	125	215	210
60	100	250	180
90	85	260	170
120	80	240	160

2.5.1 Identify the dependent variable in this investigation. (1)

2.5.2 Identify ONE factor that should be kept constant in this investigation. (1)

2.5.3 Explain why patients **1** and **3** were NOT diagnosed as diabetics. (2)

2.5.4 Explain how the blood glucose levels of patient **1** will return back to normal after 2 hours (2)
(6)

2.6 Describe how the human body restores the carbon dioxide concentration in the blood when it is above normal levels. (6)
(6)
[50]

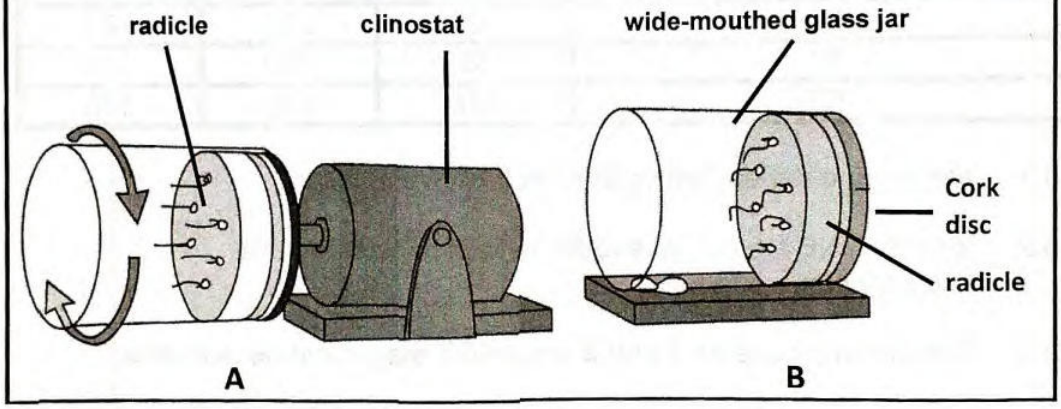
QUESTION 3

3.1 Grade 12 learners carried out an investigation to determine the effect of the force of gravity on the direction of growth of young roots (radicles) of seedlings. They set up the investigation as follows.

- They placed six germinated seedlings onto the rotating disc of a clinostat as shown in diagram **A**.
- They covered the seedlings on the clinostat with a wide-mouthed glass jar (A).
- They placed six germinated seedlings onto a cork disc as shown in diagram **B**.
- They put the cork disc on its side and covered it with a wide-mouthed glass jar (B).
- The seedlings were not rotated in **B**.
- They switched the clinostat in **A** on, so that the seedlings were continuously turning.

They left the seedlings for two days.

Diagram showing the effect of the force of gravity on the radicles of seedlings



3.1.1 Explain why the learners had to set up the rotating clinostat in diagram **A**? (2)

3.1.2 What observation could be made in diagram **B**? (2)

3.1.3 State a conclusion, based on your observations in QUESTION 3.1.2 above. (2)
(6)

3.2 Read the extract below.

> Charcot-Marie-Tooth (CMT) disease is an inherited nerve problem. It causes abnormalities in the nerves that supply your feet, legs, hands, and arms by affecting both your motor and sensory nerves. Symptoms usually first appear in teens and young adults such as weakness of your foot and lower leg muscles. It is caused by genetic problems which affect the protective lining around the axon.
>
> Neurologist may diagnose CMT after doing a complete nervous system exam through a blood or saliva test to look for genetic problems. There is no cure for CMT but physical therapy can help to strengthen and stretch your muscles.

3.2.1 Differentiate between a reflex action and reflex arc. (2)

3.2.2 From the extract, state the:

(a) effect of Charcot-Marie-Tooth (1)

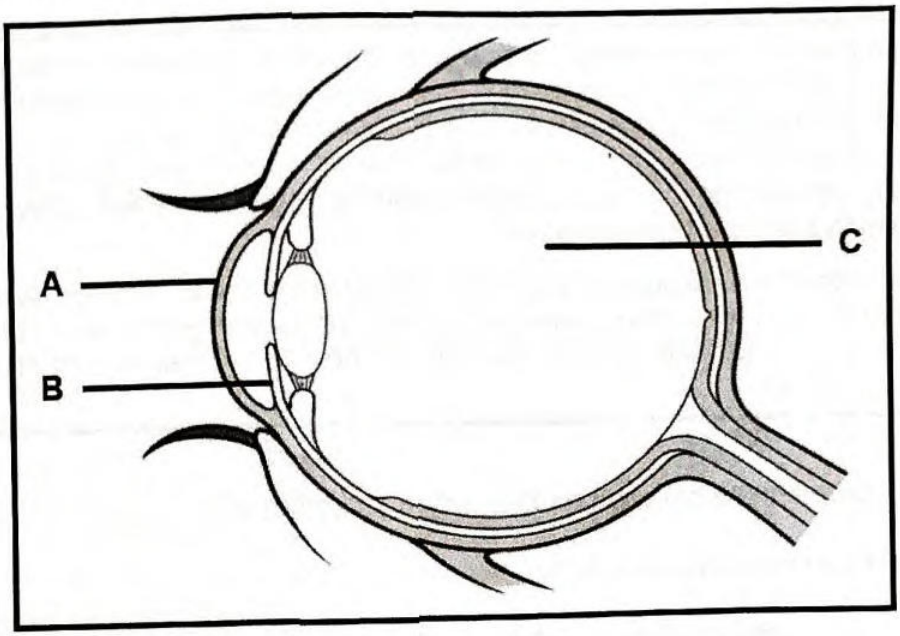
(b) symptom of Charcot-Marie-Tooth (1)

3.2.3 Name the neuron responsible for carrying signals from the brain to the muscles. (1)

3.2.4 Name the part of a neuron that degenerates, leading to multiple sclerosis. (1)

3.2.5 Explain how damage to the part named in QUESTION 3.2.4 can lead to the symptoms of multiple sclerosis, as stated in the extract. (4)
(10)

3.3 The diagram below shows the side view of a human eye.



3.3.1 Give TWO functions of the following parts:

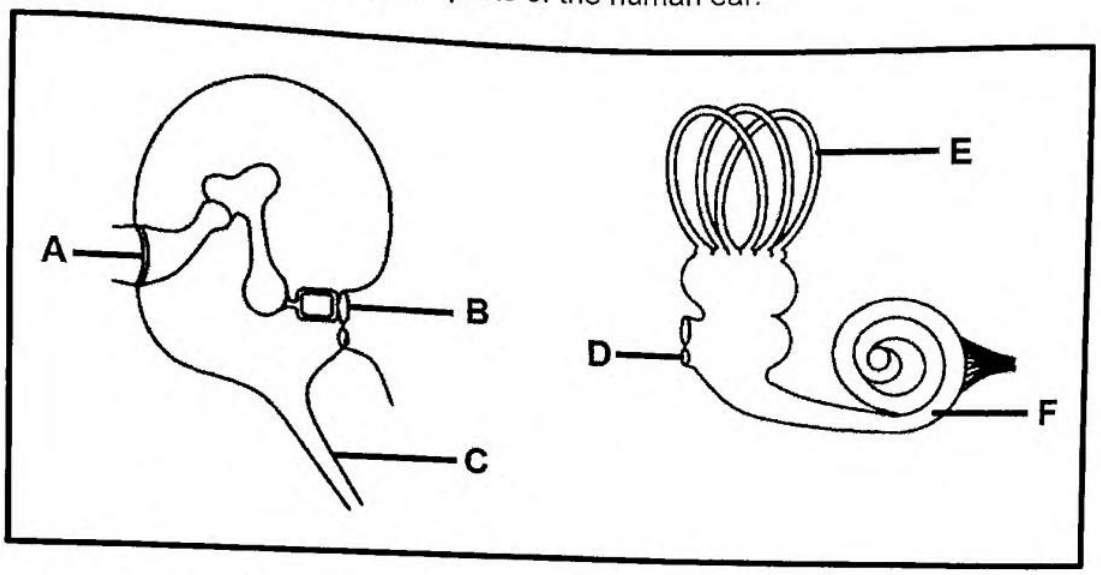
(a) **B** (2)

(b) **C** (2)

3.3.2 Explain how part **A** is adapted for its function. (2)

3.3.3 Describe the changes that occur in the eye when a person focuses on an object that is three metres away. (4)
(10)

3.4 The diagram below represents parts of the human ear.



3.4.1 Identify part **F**. (1)

3.4.2 State ONE function of part **D**. (1)

3.4.3 How are parts **A** and **B** together suited for the amplification of sound? (2)

3.4.4 Explain why a rupture (hole) in part **A** may lead to hearing loss. (2)

3.4.5 Explain the result if part **C** is blocked with mucus. (2)

3.4.6 Describe how receptors in part **E** maintain balance (4)
(12)

3.5 The table below shows the recorded number of people suffering from Alzheimer's disease in provinces in South Africa.

Year	Number of people suffering from Alzheimer's disease
2021	40
2022	70
2023	90
2024	120

3.5.1 Name TWO main symptoms of Alzheimer's Disease? (2)

3.5.2 Explain why this data in the table may not be accurate for the provinces. (1)

3.5.3 Calculate the percentage increase of number of people suffering from Alzheimer's disease from 2021 to 2024. (3)

3.5.4 Draw a line graph to represent the data in the table. (6)

(12)

[50]

TOTAL SECTION B: 100

GRAND TOTAL: 150