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education

MPUMALANGA PROVINCE

REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P1

SEPTEMBER 2025

MARKS: 150

TIME: 2½ HOURS

This question paper consists of 20 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 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.

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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.

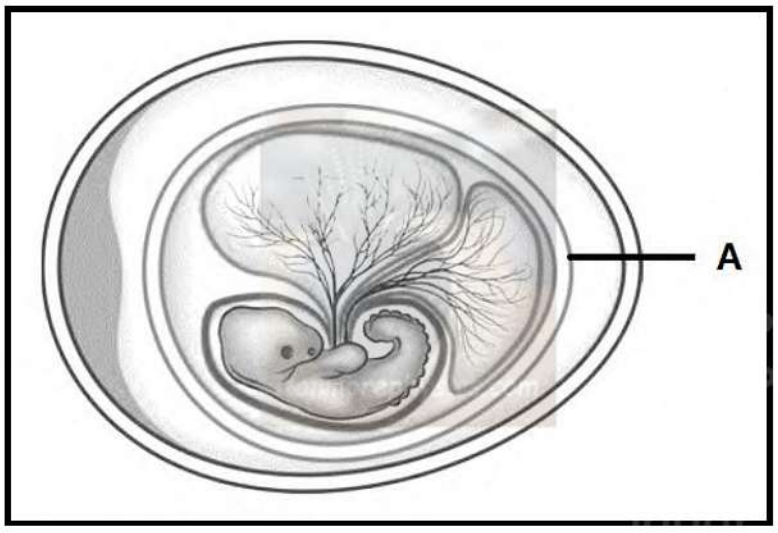
1.1.1 Which of the following involves the development of the young inside the uterus of the mother, where it receives nutrients through the placenta?

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.

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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

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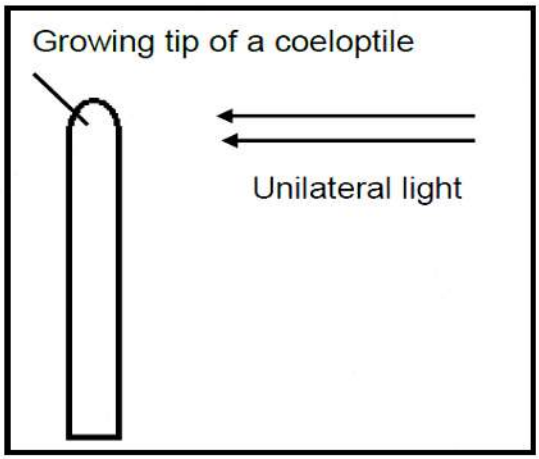
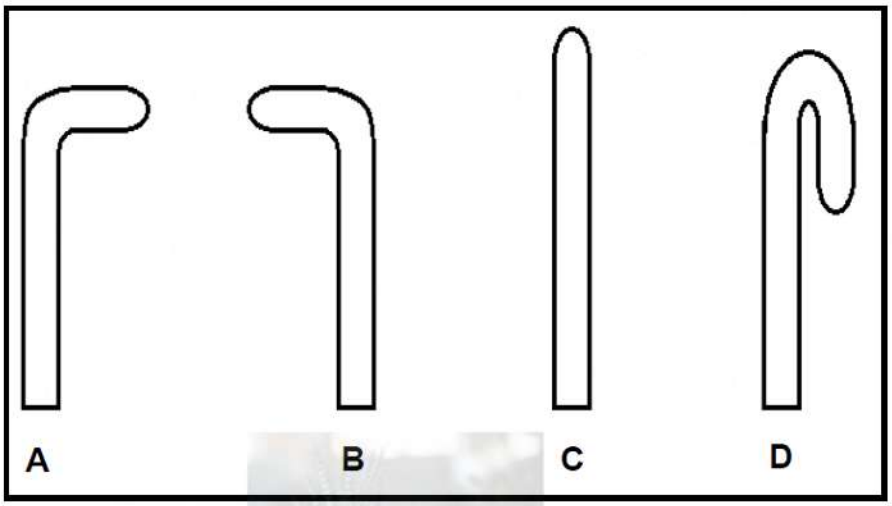
1.1.7 The diagram below represents a growing tip of a coleoptile (young plant shoot) exposed to unilateral light.



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.

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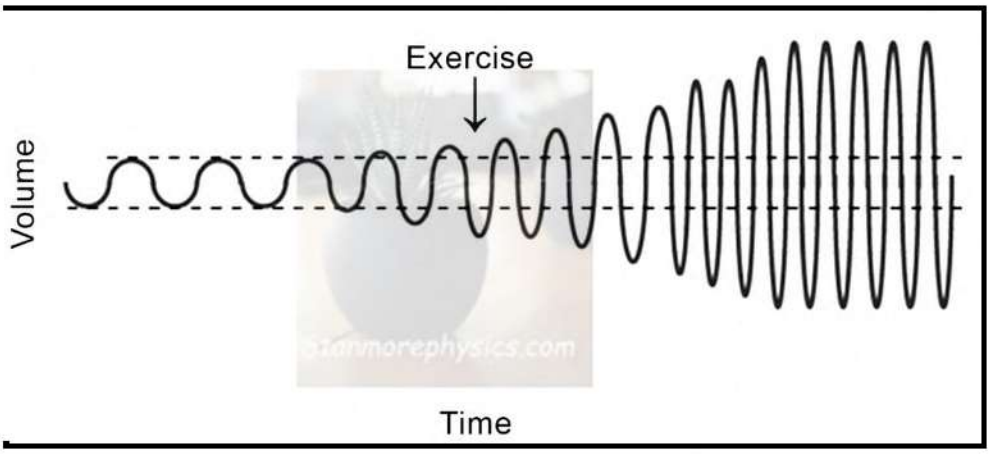
QUESTIONS 1.1.9 and 1.1.10 are based on the graph below which is known as a spirometer trace and is used to determine the volume of air a person inhales and exhales, as well as their breathing rate (the number of breaths over a period of time).



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)**

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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)**

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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)**

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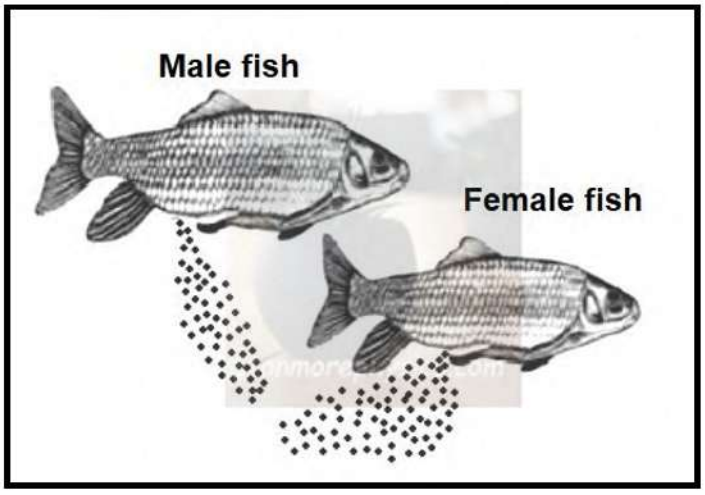
1.4 The diagram below represents a reproductive strategy in a fish species.



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)

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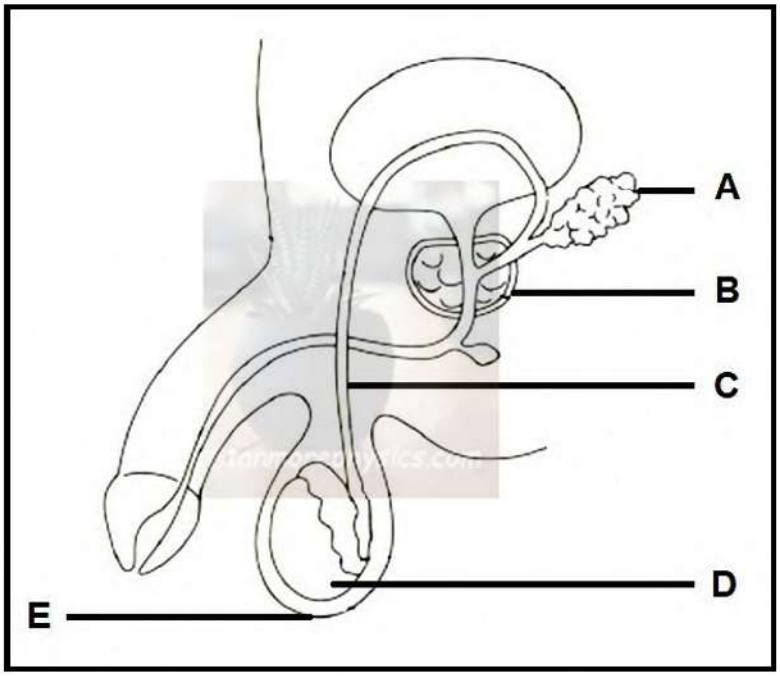
1.5 The diagram below represents parts of the human male reproductive system.



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

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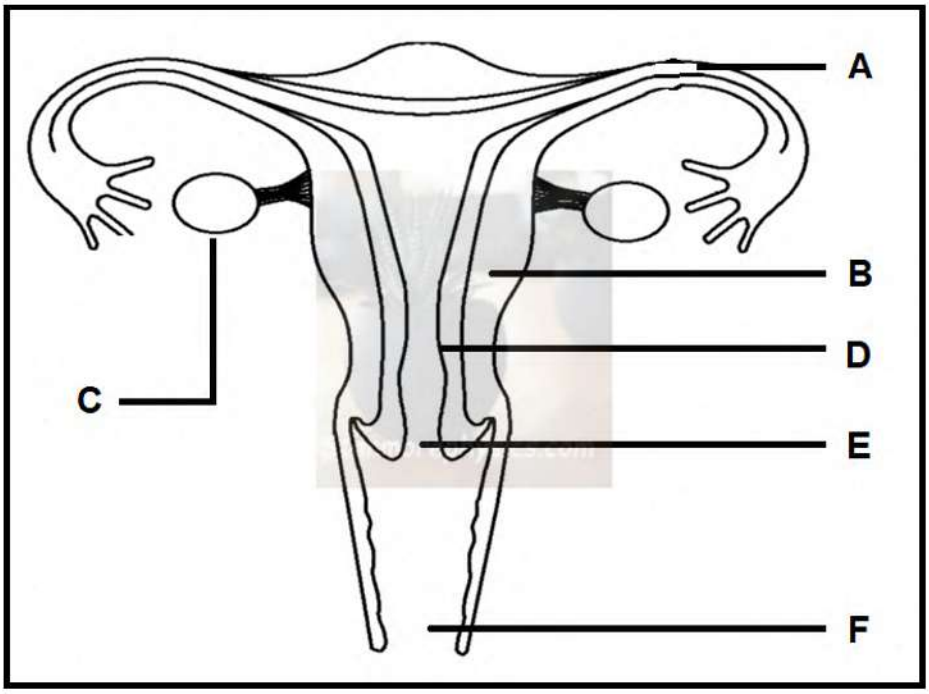
SECTION B

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)

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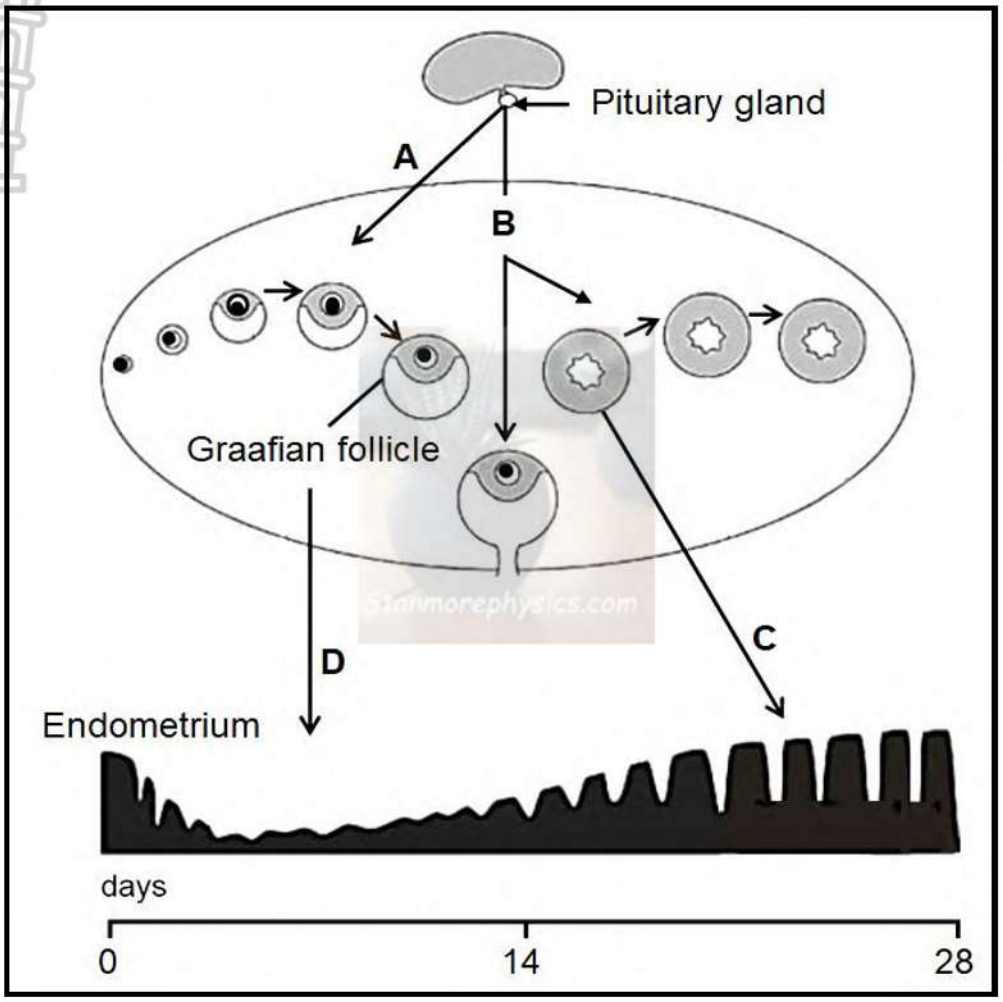
2.2 The diagram below represents some changes that occur in the human female body during the menstrual cycle. The letters A to D represent hormones.



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)

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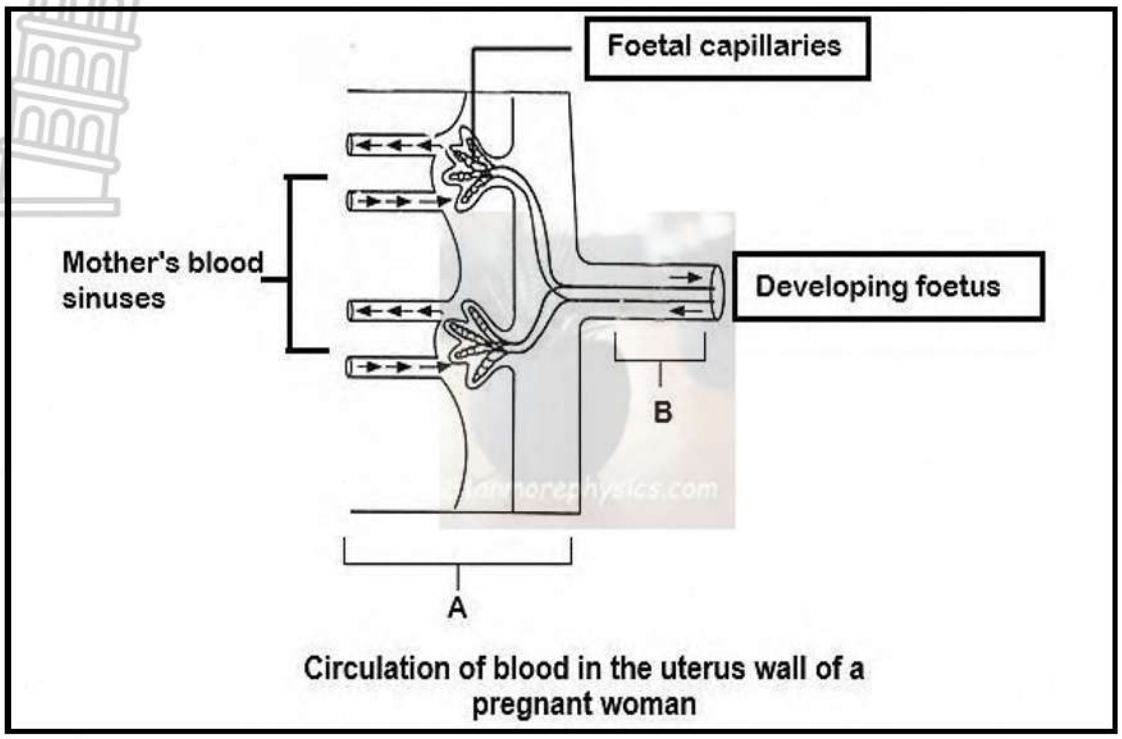
2.3 The diagram below illustrates the circulation of blood in the uterus wall of a pregnant woman. The arrows show the direction of blood flow.



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)

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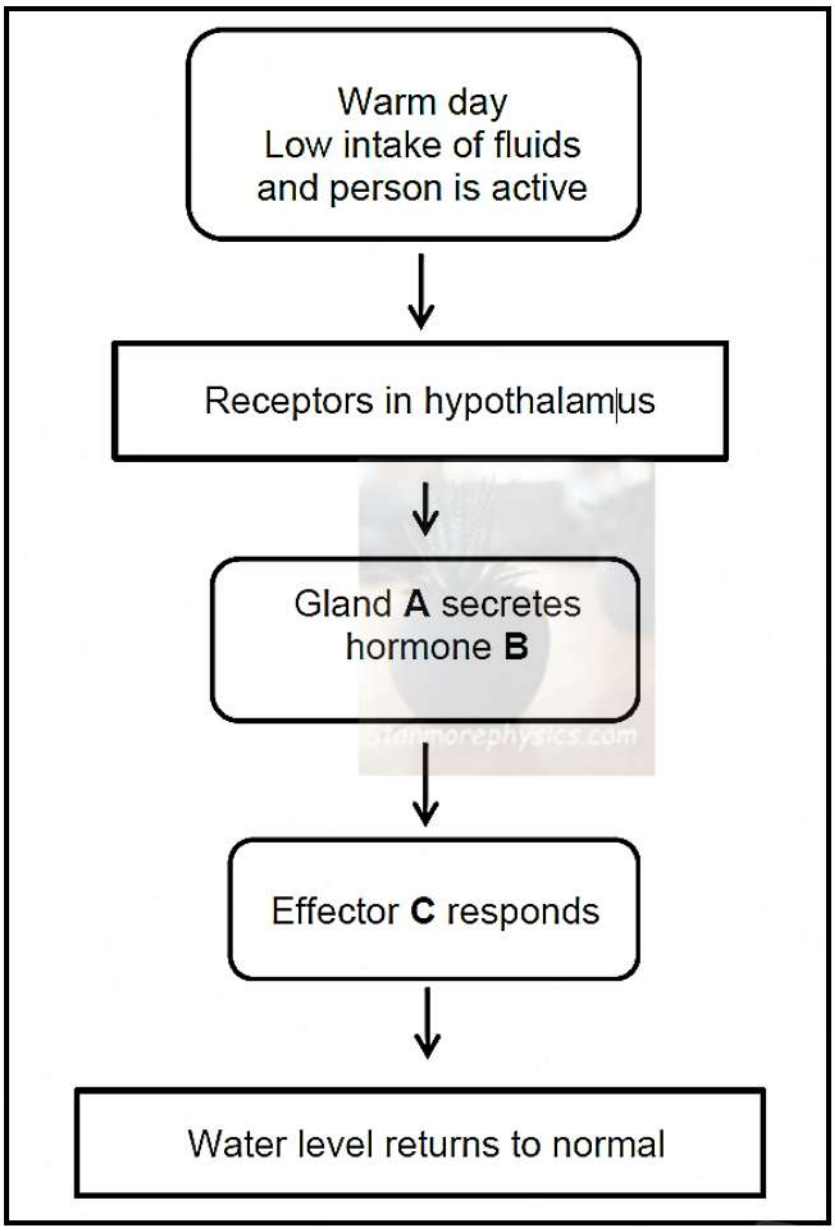
2.4 The flow diagram below represents osmoregulation in the human body.



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)

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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]

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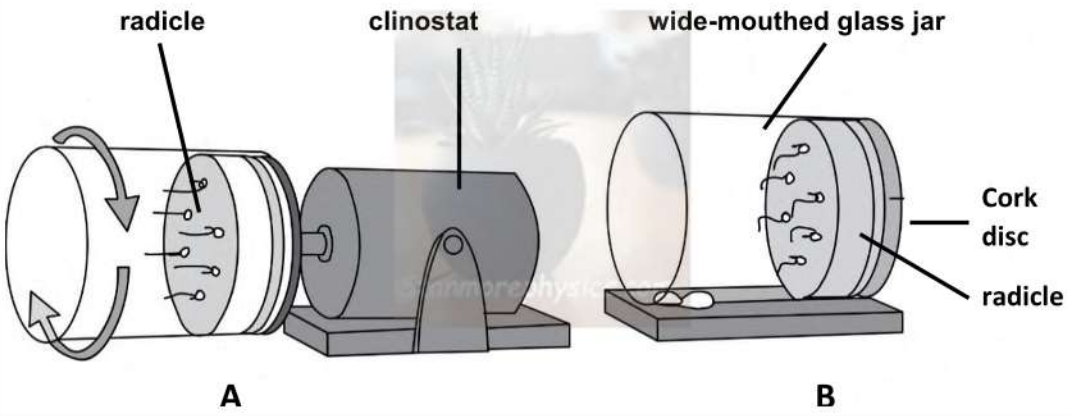
QUESTION 3

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)

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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)

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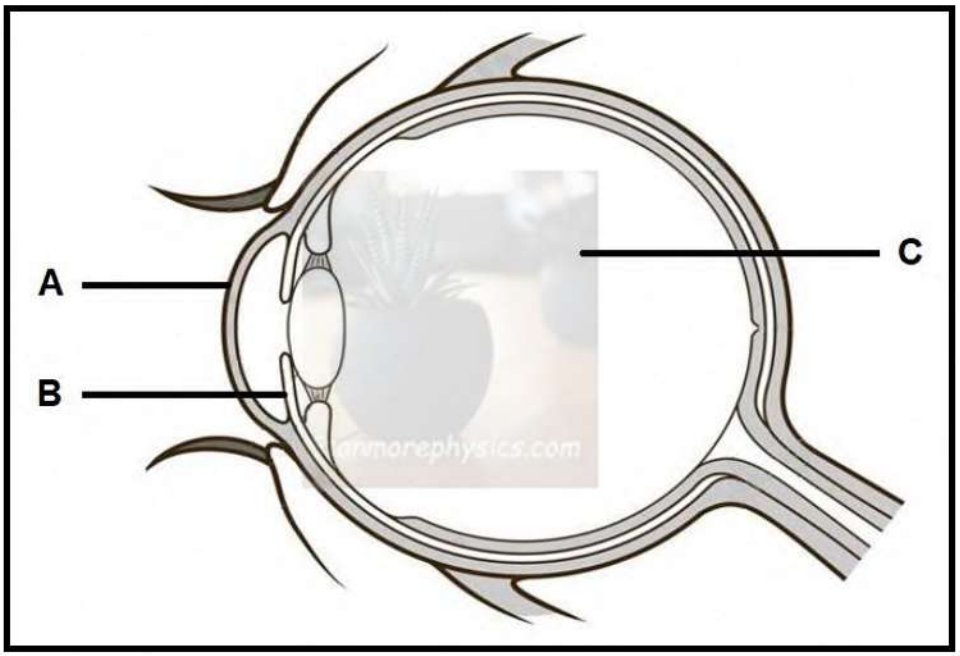
3.3 The diagram below shows the side view of a human eye.



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)

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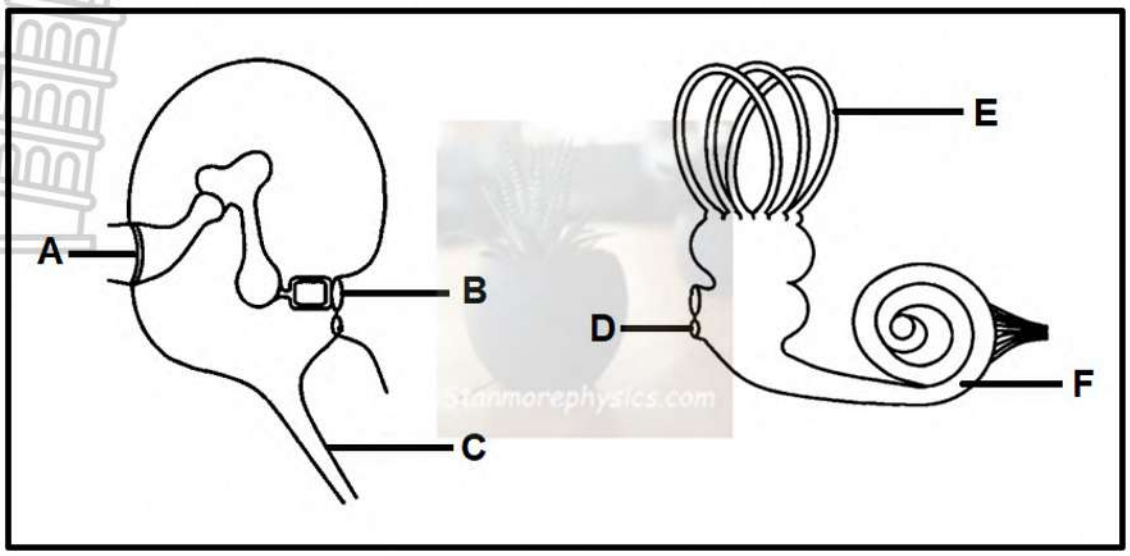
3.4 The diagram below represents parts of the human ear.



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)

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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

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MPUMALANGA PROVINCE
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NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P1

SEPTEMBER 2025

MARKING GUIDELINES (AMENDED)

MARKS: 150

This marking guideline consists of 11 pages.

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PRINCIPLES RELATED TO MARKING LIFE SCIENCES

1. **If more information than marks allocated is given**
   Stop marking when maximum marks is reached and put a wavy line and 'max' in the right-hand margin.

2. If, for example, three reasons are required and five are given
   Marks for the first three irrespective of whether all or some are correct/incorrect.

3. **If whole process is given when only a part of it is required**
   Read all and credit the relevant part.

4. **If comparisons are asked for but descriptions are given**
   Accept if the differences/similarities are clear.

5. **If tabulation is required but paragraphs are given**
   Candidates will lose marks for not tabulating.

6. **If diagrams are given with annotations when descriptions are required**
   Candidates will lose marks.

7. **If flow charts are given instead of descriptions**
   Candidates will lose marks.

8. **If sequence is muddled and links do not make sense**
   Where sequence and links are correct, credit. Where sequence and links are incorrect, do not credit. If sequence and links become correct again, resume credit.

9. **Non-recognised abbreviations**
   Accept if first defined in answer. If not defined, do not credit the unrecognised abbreviation but credit the rest of the answer if correct.

10. **Wrong numbering**
    If answer fits into the correct sequence of questions but the wrong number is given, it is acceptable.

11. **If language used changes the intended meaning**
    Do not accept.

12. **Spelling errors**
    If recognisable, accept the answer, provided it does not mean something else in Life Sciences or if it is out of context.

13. **If common names are given in terminology**
    Accept if it appears on marking guidelines.

14 **If only the letter is asked for but only the name is given (and vice versa)**
   Do not credit.

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15. **If units are not given in measurements**
Marking guidelines will allocate marks for units separately, except where it is given in the question.

16. **Be sensitive to the sense of an answer, which may be stated in a different way.**

17. **Caption**
All illustrations (diagrams, sketches, graphs, tables, etc.) must have a cation.

18. **Code-switching of official languages (terms and concepts)**
A single word or two that appears in any official language other than the learners' assessment language used to the greatest extent in his/her answers should be credited, if it is correct.

19. **Changes**
No changes must be made to the marking guidelines without consulting the Provincial Internal Moderator.

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SECTION A

QUESTION 1

1.1	1.1.1	C ✓✓		
	1.1.2	B ✓✓		
	1.1.3	D ✓✓		
	1.1.4	B ✓✓		
	1.1.5	A ✓✓		
	1.1.6	D ✓✓		
	1.1.7	A ✓✓		
	1.1.8	B ✓✓		
	1.1.9	C ✓✓		
	1.1.10	A ✓✓	10 x 2	**(20)**

1.2	1.2.1	Testosterone✓		
	1.2.2	Ovarian cycle✓		
	1.2.3	Epididymis✓		
	1.2.4	Vasodilation✓		
	1.2.5	Tropism✓		
	1.2.6	Prolactin✓		
	1.2.7	Medulla oblongata✓		
	1.2.8	Thyroxin✓		
	1.2.9	Autonomic✓nervous system		
	1.2.10	Hormones✓	(10 x 1)	**(10)**

1.3	1.3.1	None ✓✓		
	1.3.2	B only ✓✓		
	1.3.3	None ✓✓		
	1.3.4	Both A and B ✓✓	(4 x 2)	**(8)**

1.4	1.4.1	External✓		(1)
	1.4.2	Ovipary✓/ oviparous		(1)
	1.4.3	- A large number of gametes from the male and female fish released✓ - the male and female fish are close to each other✓/ the male fish release the sperms closer to the eggs/ the gametes of both male and female are close to each other	Any	(2)
	1.4.4	- The eggs are laid in water✓ - Which prevents them from drying out✓/ dehydration/ desiccation		(2) **(6)**

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1.5 1.5.1 (a) Vas deferens✓/Sperm duct (1)

1.5.2 - Secrete a fluid✓
- Which further increase the mobility of the male gametes/ sperm cells✓ (2)

1.5.3 Spermatogenesis✓ (1)

1.5.4 - The laptop radiates / releases heat✓
- Which will increase the temperature of the scrotum✓
- Resulting in an increase in the temperature of the testes✓
- Sperm production will be negatively affected✓
- Therefore, resulting in less sperms or unhealthy sperms being produced✓

Any (2)

TOTAL SECTION A: 50

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SECTION B
QUESTION 2

2.1 2.1.1 F✓ – vagina✓ (2)

2.1.2 (Diploid) zygote ✓ (1)

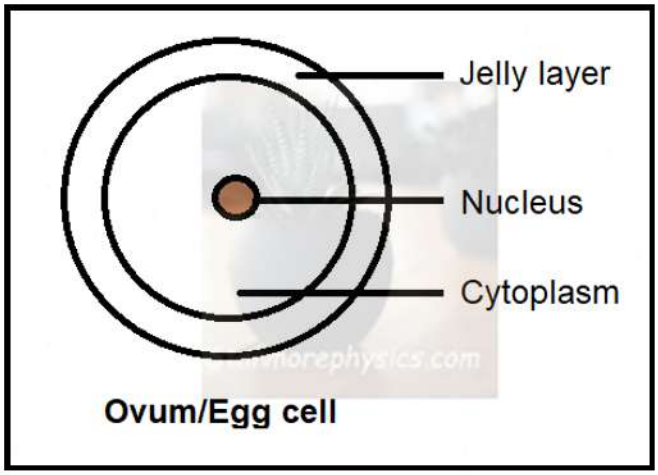
2.1.3 - Encloses and protects the developing embryo✓ /foetus
- Contracts during labour✓ for childbirth (2)

2.1.4 - Luteinising hormone✓ / LH (1)

2.1.5 - Part **D** /endometrium breaks down✓/ disintegrate
- Such that the Blood together with the unfertilised egg✓
- leaves the body of the woman through the vagina✓ any (2)

2.1.6 - part A/ fallopian tubes will be blocked✓ prevents the sperms from reaching the ovum✓. (2)

2.1.7



Description	Mark allocation
Caption (**C**)	✓
Drawing (**D**)	✓
Any label(**L**)	✓

(3)
(13)

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2.2 2.2.1 Oestrogen✓ (1)

2.2.2 Day 14 ✓ (1)

2.2.3 - if fertilisation occurs
- the corpus luteum does not disintegrate✓/ degenerate/ shrink
- it continues to secrete progesterone✓/hormone **C**
- The high progesterone levels✓in the blood
- will inhibit the pituitary gland✓from secreting hormone **A**/ FSH✓
- ensuring that no new follicles are formed✓

Any (5)
(7)

2.3 2.3.1 Placenta✓ (1)

2.3.2 - Nutrients/ oxygen will not be transported to the foetus✓,therefore no growth will occur✓/ foetus will die/ abort since there will be no energy produced
- Waste products/ CO_2 will not be transported back to the placenta✓ increasing toxicity✓,resulting in death of the foetus

Any (1 x2) (2)

2.3.3

Vein	Artery
High oxygen content✓	Low oxygen content✓
High Nutrient content✓	Low Nutrient content ✓
Low CO_2 content✓	High content✓
Low Nitrogenous waste✓	High Nitrogenous waste✓

(Mark first TWO only)

Any (2x2) + 1 for table (5)
(8)

2.4 2.4.1 The maintance of a constant internal✓ water balance✓ (2)

2.4.2 Kidney✓ (1)

2.4.3 (a) ADH✓/ antidiuretic hormone (1)

(b) Pituitary gland✓/ hypophysis (1)

2.4.4 - The tumor on gland A/ pituitary gland will reduce the size of the pituitary gland✓
- Therefore, less ADH✓/ Hormone **B** will be secreted
- Less ADH will decrease the permeability of the renal tubes✓
- Less water will be reabsorbed✓ back into the blood✓ (5)
- While most of the water will be lost as urine✓

(10)

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2.5 2.5.1 Blood glucose level✓ (1)

2.5.2
- Weight of the patient✓
- age of patient✓
- period of fasting✓
- amount of glucose solution given to patient✓
- time of measurement for all patients
- instrument used for measuring glucose level✓

Any (1)

2.5.3 After 2 hours, their glucose levels were less than 200 mg/ 100ml✓✓ (2)

2.5.4
- the pancreas will secrete glucagon✓
- glucagon will stimulate the liver✓ to covert the stored glycogen back into glucose✓
- causing the glucose level to increase back to 90mg/ 100ml✓/ back to normal.

Any (2)

2.6
- Receptor cells✓
- in the carotid artery in the neck are stimulated✓
- to send impulses to the medulla oblongata✓ in the brain
- medulla oblongata stimulates breathing muscles✓/intercostal muscles and diaphragm
- and heart✓
- breathing muscles contract more actively✓
- this increases the rate and depth of breathing✓
- the heart beats faster✓
- more carbon dioxide is taken to the lungs and exhaled✓
- the carbon dioxide in the blood returns back to normal

Any (6)
(6)
[50]

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QUESTION 3

3.1 3.1.1 - To remove the effect of gravity✓
- on the direction of growth of young roots (radicles)✓ (2)

3.1.2 Radicles in diagram **B** will grow✓and bend towards gravity✓ (2)

3.1.3 The force of gravity has an effect on the direction of growth of young roots (radicles)✓✓ (2)
(6)

3.2 3.2.1 - A reflex action is a rapid, automatic response to a stimulus received by an organ or receptor✓
- whereas A reflex arc is the path taken by an impulse during a reflex action✓ (2)

3.2.2 (a) It causes abnormalities in the nerves that supply your feet, legs, hands, and arms✓ (1)

(b) Weakness on foot and lower leg muscles✓ (1)

3.2.3 Motor neuron✓ (1)

3.2.4 Myelin sheath✓ (1)

3.2.5 - Axon is no longer insulated✓
- This causes the speed of transmission of nerve impulses to decrease✓
- which can lead to a delayed response✓and
- therefore, loss/ poor of muscle control✓ (4)
(10)

3.3 3.3.1 (a) - Regulates the amount of light entering the eye✓
- Controlling the size of the pupil✓ (2)

(b) - Contains nutrients for the inner eye✓
- Maintains eyeball shape✓
- Transparent to allow for transmission of light to retina✓
Mark first TWO only (2)

3.3.2 - The cornea is transparent✓ to allow light to enter the eye✓
- and it is curved/ convex✓ to allow for refraction of light✓ any(1x2) (2)

3.3.3 - Ciliary muscles contract✓
- Suspensory ligaments slacken✓
- Tension on the lens decreases✓
- Lens becomes more convex✓/ bulged
- Refractive power of lens will increase✓/ light rays are refracted more Any (4)
(10)

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3.4	3.4.1	Cochlea✓	(1)
	3.4.2	Part **D**/round window prevents pressure build-up of waves✓/absorbs pressure wave set up by tympanic membrane in the inner ear/eases sound waves out of inner ear	(1)
	3.4.3	Part **A**/Tympanic membrane has a larger surface area✓than the part **B**/oval window✓	(2)
	3.4.4	- No/ less vibrations will occur✓ - and no pressure wave will be created in the inner ear✓ - Organ of Corti/hair cells will not be stimulated✓ - Therefore, impulses will not be sent to the cerebrum✓ Any	(2)
	3.4.5	- Ossicles will not vibrate freely✓ - to transmit vibrations to the inner ear✓/causing partial deafness **OR** - Cannot equalise pressure✓on the either side of tympanic - membrane leading to pain✓/ middle ear infection/ a burst auditory canal/ vibrations not being transmitted/ partial deafness	(2)
		OR - No air will enter or leave the Eustachian tube✓ - and it will not equalise pressure from either side of the tympanic membrane✓	(2)
	3.4.6	- Change is speed✓ and direction of head - Stimulates the cristae (receptors)✓ - Stimulus is converted to an impulses✓ - Impulse is transmitted to the cerebellum✓ - Via the auditory nerve✓ - The cerebellum✓ sends impulses to voluntary / skeletal - muscles✓to maintain balance Any	(4) **(12)**

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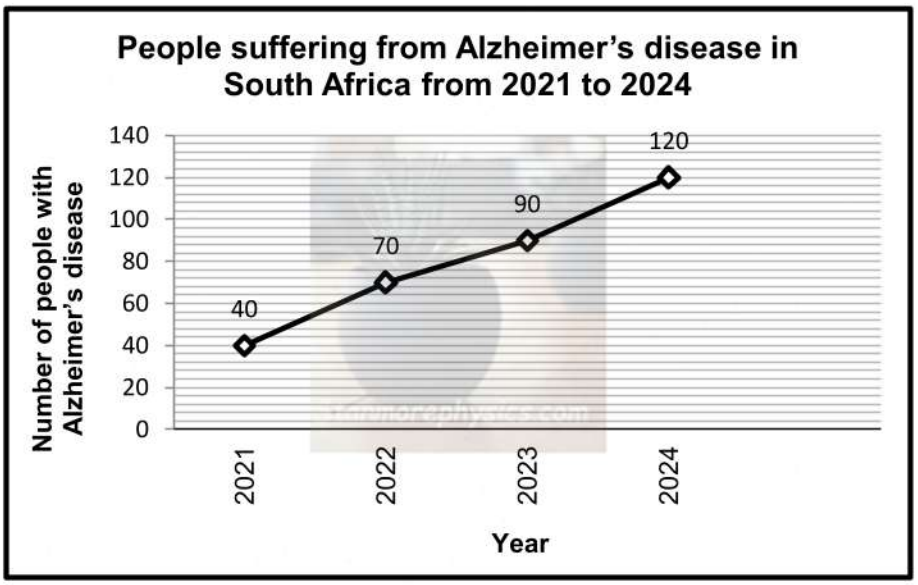
3.5 3.5.1 - Memory loss✓
- Confusion✓ (2)

3.5.2 - Not all people suffering from Alzheimer's disease are recorded✓
- Poor health facilities✓ Any (1)

3.5.3 $\frac{120 - 40}{40}]$✓ $\times 100$ ✓
= 200 %✓ (3)

3.5.3



Criteria for marking graph:

Criteria	Mark allocation
Line graph is drawn (T)	1
Caption of the graph includes both variables (C)	1
Correct labels on X-axis and Y-axis (L)	1
Correct scale for X and Y-axis (Equal spacing between intervals for each axis (S)	1
Plotting: (P) 1-3 co-ordinates plotted correctly All 4 co-ordinates plotted correctly	 1 2

(6)
(12)
[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150

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