Province of the
EASTERN CAPE
EDUCATION

Iphondo leMpuma Kapa: Isebe leMfundo
Provinsie van die Oos Kaap: Department van Onderwys
Porafensie Ya Kapa Botjahabela: Lefapha la Thuto

NATIONAL SENIOR CERTIFICATE

GRADE 12

SEPTEMBER 2025

LIFE SCIENCES P1

MARKS: **150**

TIME: **2½ hours**

This question paper consists of 18 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. ALL drawings MUST be done in pencil and labelled 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. All calculations to be rounded off to TWO decimal places.
12. 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 1.1.10) in the ANSWER BOOK, for example 1.1.11 D.

1.1.1 A key function of the scrotum:

A Produces the male sex hormone, testosterone
B Regulates the temperature of the testes
C Stores mature spermatozoa
D Transports spermatozoa to the urethra

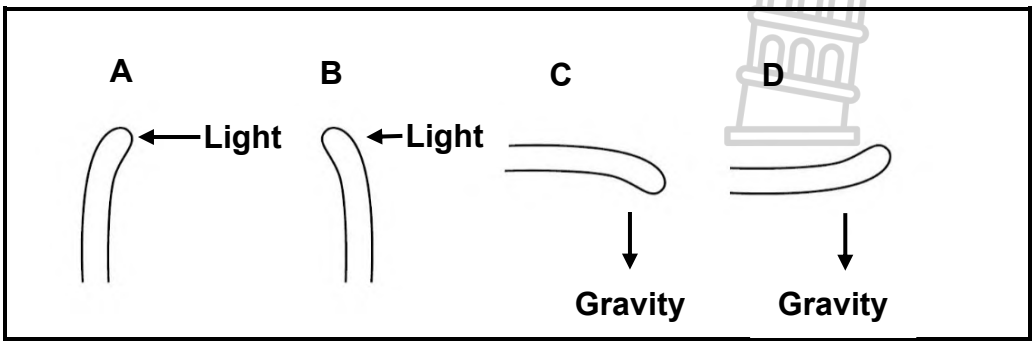
1.1.2 An eye condition where the cornea and/or lens is not perfectly rounded, causing light not to be properly focused on the retina.

A Astigmatism
B Short sightedness
C Long sightedness
D Cataract

1.1.3 The part of the brain that functions as the control center for hunger, thirst, sleep, and body temperature regulation is the …

A cerebellum.
B hypothalamus.
C cerebrum.
D medulla oblongata.

1.1.4 Which of the coleoptiles displayed below demonstrates negative geotropism after 48 hours?



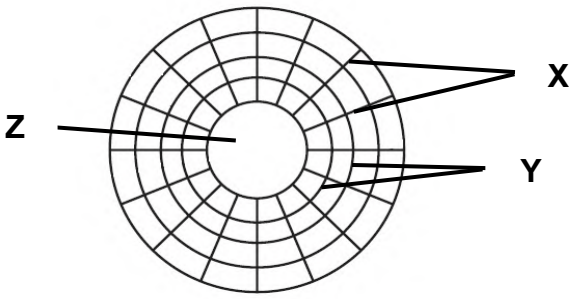
1.1.5 The following is a list of target effectors.

(i) Pancreas
(ii) Muscles
(iii) Testes
(iv) Liver

Which of the structures listed above are directly targeted by human growth hormone to stimulate growth and metabolism?

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

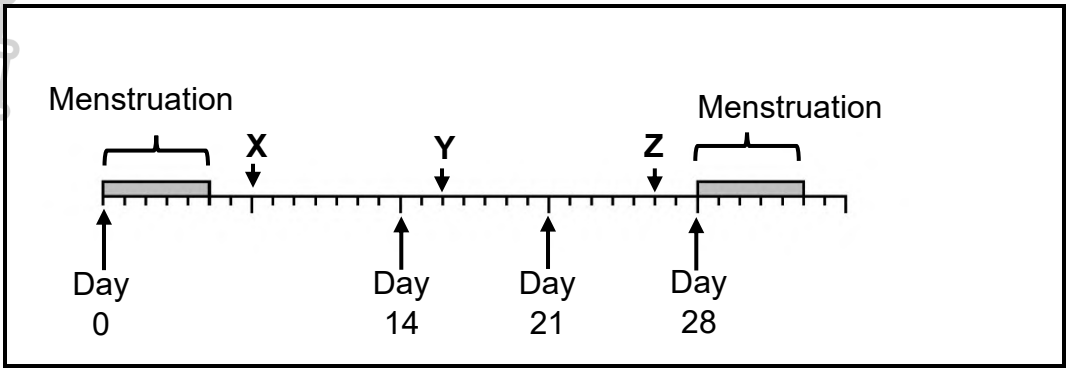
1.1.6 The diagram below represent the pupillary mechanism in the human eye.



A person suddenly looks up from their bright mobile phone screen to a dark room. What structural changes occur in **X, Y** and **Z** respectively?

	X	Y	Z
A	Contract	Relax	Constrict
B	Relax	Contract	Dilate
C	Contract	Relax	Dilate
D	Relax	Contract	Constrict

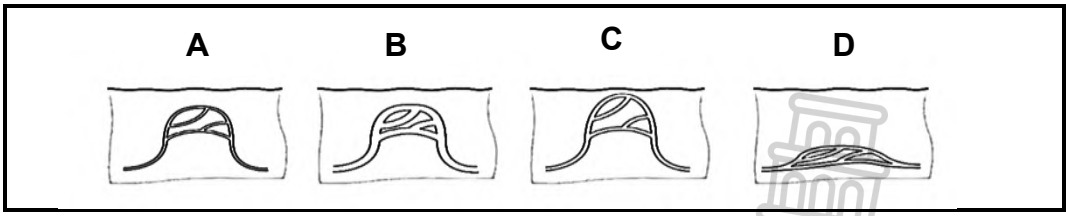
1.1.7 The illustration below represents a 28-day menstrual cycle.



Based on the above illustration, select the correct option of different hormonal levels.

	Hormone X	Hormone Y	Hormone Z
A	Progesterone increases	LH is high	Oestrogen decreases
B	FSH increases	LH is low	Progesterone decreases
C	Progesterone decreases	LH is low	Oestrogen increases
D	FSH increases	LH is high	Progesterone increases

1.1.8 Which ONE the following diagrams best suit the homeostatic processes of the skin when the median temperature drops below 0 °C?



1.1.9 The part of the eye that prevents internal reflection of light.

A Choroid
B Sclera
C Cornea
D Aqueous humor

1.1.10 A man injures his arm in an accident. Afterwards, he can feel objects touching his hand, but he cannot move his hand away from them.

What is most likely to have caused this?

A Receptors in his hand are damaged.
B The nerve connection is cut only between his central nervous system and the effectors in his arm.
C The nerve connection is cut only between the receptors in his hand and his central nervous system.
D Both nerve connections, to and from the central nervous system are cut off.

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

1.2.1 Period when males and females reach sexual maturity

1.2.2 A mechanical defence mechanism employed by plants to deter herbivory

1.2.3 Reproductive methods used by organisms to maximise their reproductive success

1.2.4 The use of two eyes with overlapping fields of view so that separate images are combined and interpreted

1.2.5 The two oval-shaped organs located in the male reproductive system which produce the male hormone testosterone

1.2.6 The target organ for the hormone aldosterone responsible for salt regulation

1.2.7 Detectable changes that have occurred in the internal and/or external environment to which a response is generated

1.2.8 Membrane in the amniotic egg that allows for gaseous exchange and, forms the placenta in mammals

1.2.9 An autoimmune disease characterised by the degradation of myelin sheath and the slowing down of nerve impulses

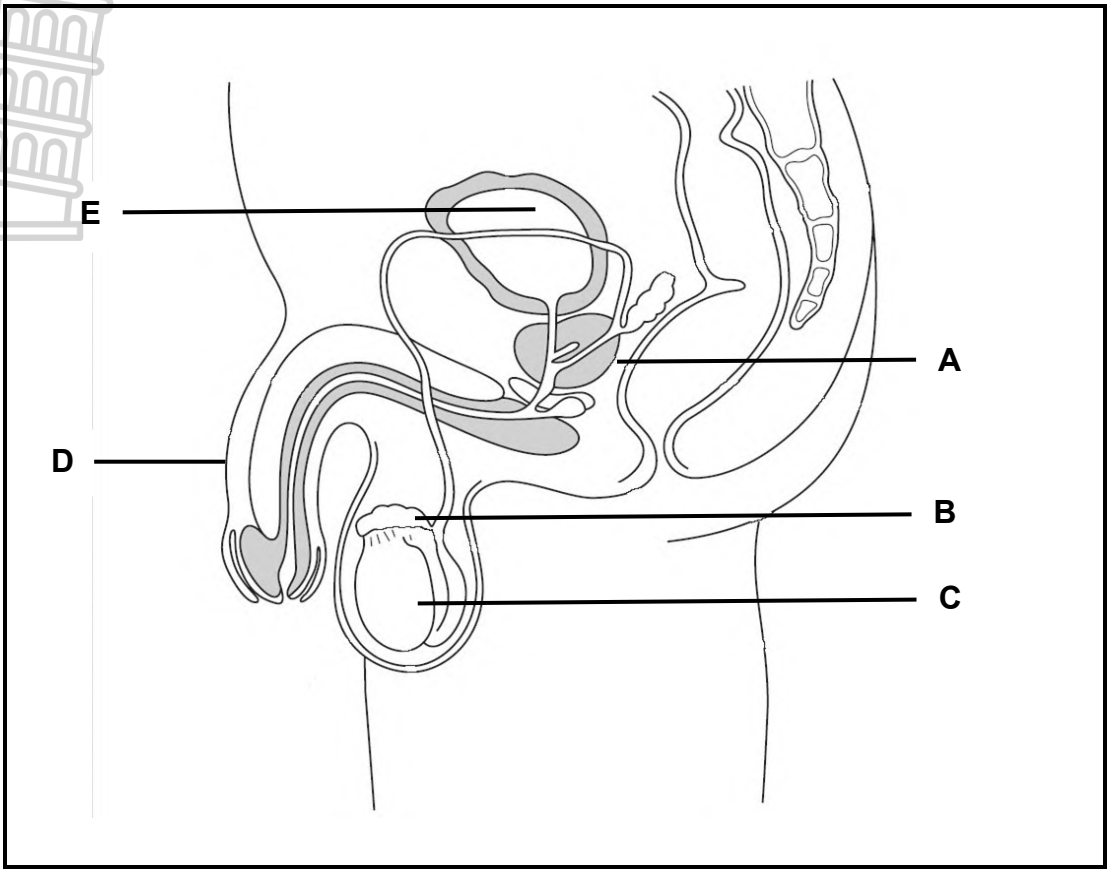
(9 x 1) (9)

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 (1.3.1–1.3.3) in the ANSWER BOOK.

COLUMN I		COLUMN II
1.3.1	Components of a negative feedback system	A: Control centre B: Effector
1.3.2	Secretory products released into a duct, not the blood	A: Endocrine gland B: Exocrine gland
1.3.3	Components of the central nervous system	A: Cranial nerves B: Spinal nerves

(3 x 2) (6)

1.4 The diagram below represents the side view of the human male reproductive system.



1.4.1 Give the LETTER and NAME of the structure that:

(a) Produces an alkaline fluid that neutralisers the vagina's acidity (2)

(b) Stores mature spermatozoa (2)

1.4.2 Explain ONE way how structure **D** increases the chances of internal fertilisation. (2)

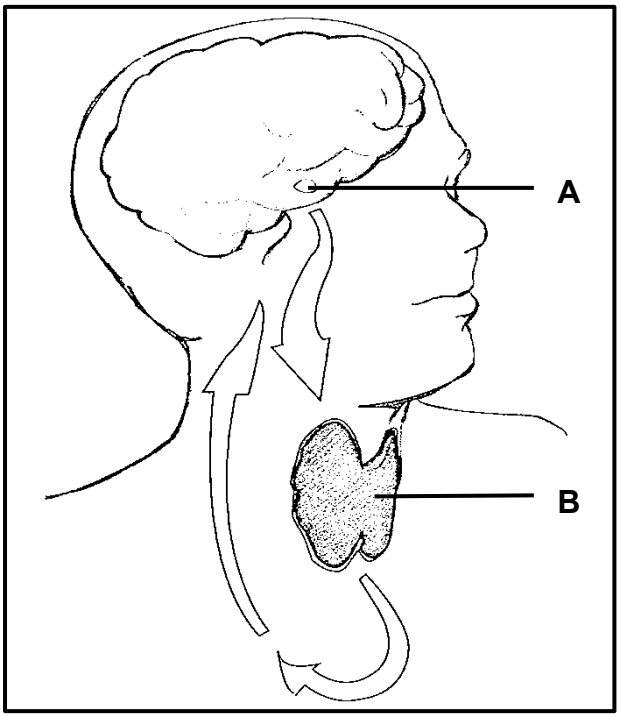
1.5 1.5.1 Name the:

(a) Reproductive strategies in which eggs are produced (1)

(b) Extra embryonic membrane that collects nitrogenous waste and assists in the exchange of gases (1)

1.5.2 List TWO benefits of vivipary that increase foetus survival. (2)

1.6 The diagram below represents the interaction between two important endocrine glands.



1.6.1 Identify the:

(a) Hormone secreted by **A** (1)

(b) Gland represented by **B** (1)

(c) Type of interaction represented by the diagram (1)

1.6.2 Name the:

(a) Disorder that is characterised by the enlargement of gland **B** (1)

(b) Hormone that stimulates the body to increase the metabolic rate when required (1)

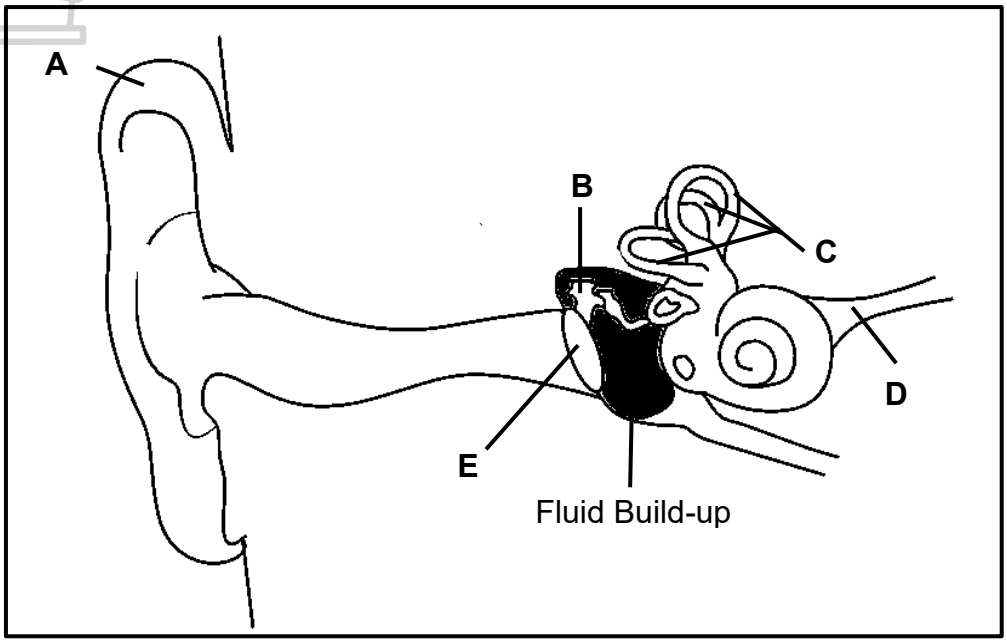
[50]

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 Glue ear, also known as '*otitis media with effusion*,' is a condition where fluid builds up in the middle-ear. The diagram below displays this condition.



2.1.1 Identify part:

(a) **A** (1)

(b) **D** (1)

2.1.2 Describe how glue ear will inhibit the functioning of structures **E** and **B**. (4)

2.1.3 State a suitable treatment to drain fluid build-up. (1)

2.1.4 Identify ONE precaution to prevent fluid build-up when swimming with the treatment mentioned in QUESTION 2.1.3. (1)

2.1.5 Explain TWO ways structure **C** is adapted for its function. (4)

2.2 The table below shows the distance of an object from the eye and the approximate lens thickness (mm).

DISTANCE OF OBJECT FROM EYE (m)	LENS THICKNESS (mm)
20	3,5
17	3,7
12	3,8
6	4,0
2	4,3
1	4,5
0,4	5,2

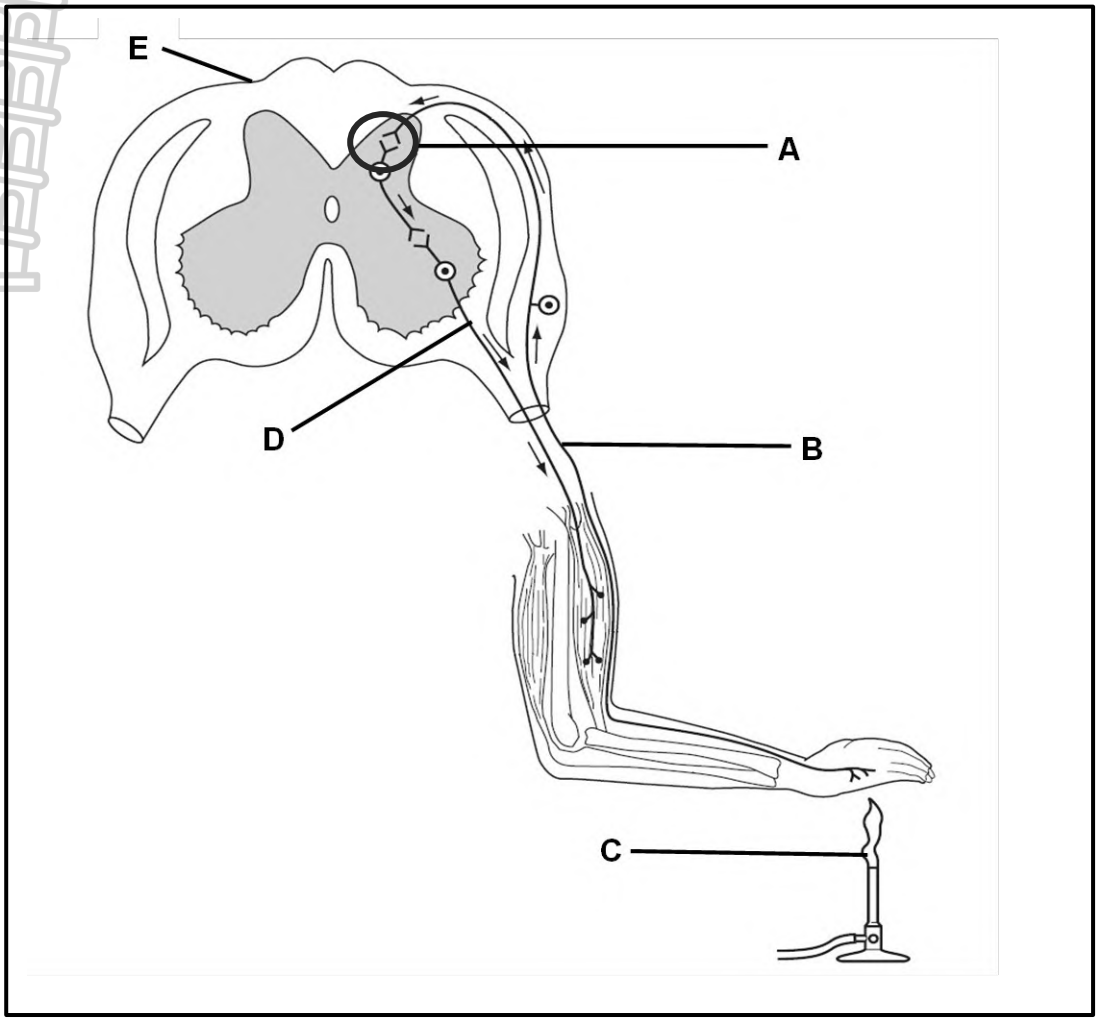
2.2.1 Name the process that occurs in the eye when an object is closer than six meters. (1)

2.2.2 Describe the changes in the eye that allow a clear image to form on the retina when an object is 17 meters away. (4)

2.2.3 If the lens is fixed and unable to change its curvature due to near-sightedness.

Draw a diagram of the spectacle lens needed to correct this for seeing distant objects. Include the path of incoming light rays and how they are adjusted to focus correctly on the retina. (3)

2.3 The diagram below shows a reflex arc.



2.3.1 Define the term *reflex arc*. (2)

2.3.2 Apart from being the reflex centre, describe ONE additional function of part **E**. (2)

2.3.3 Tabulate TWO visible structural differences between neurons **B** and **D**. (5)

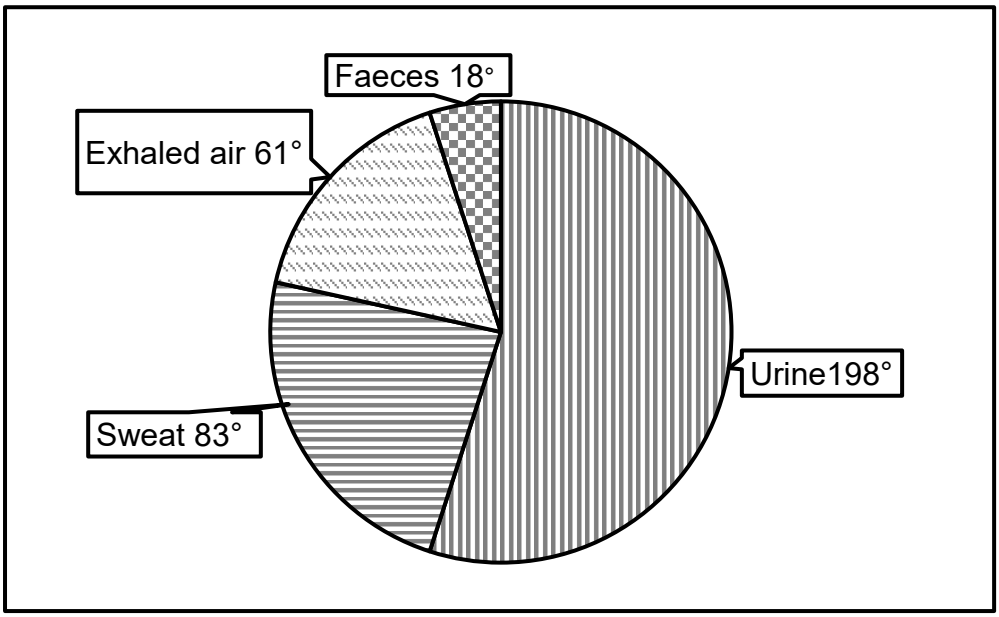
2.3.4 Identify the structure formed at part **A** and state TWO of its significances. (3)

2.4 Most effector organs of the human body are double innervated, meaning they receive connections from both sympathetic and parasympathetic nerve fibres.

2.4.1 To which division of the nervous system do the above nerve fibres belong? (1)

2.4.2 Discuss ONE reason, for each type of nerve fibre, as to why the heart requires double innervation. (4)

2.5 The pie chart below displays the collective amount of water lost by an individual over a 24-hour period. The total amount of water lost was 2 600 cm^3.



2.5.1 Name the hormone secreted from the adrenal glands, that helps regulate water balance. (1)

2.5.2 Determine the amount of water, in cm^3, lost through sweat. (3)

2.5.3 Explain how ADH assists to conserve water. (4)

2.5.4 From your observations of the above graph:

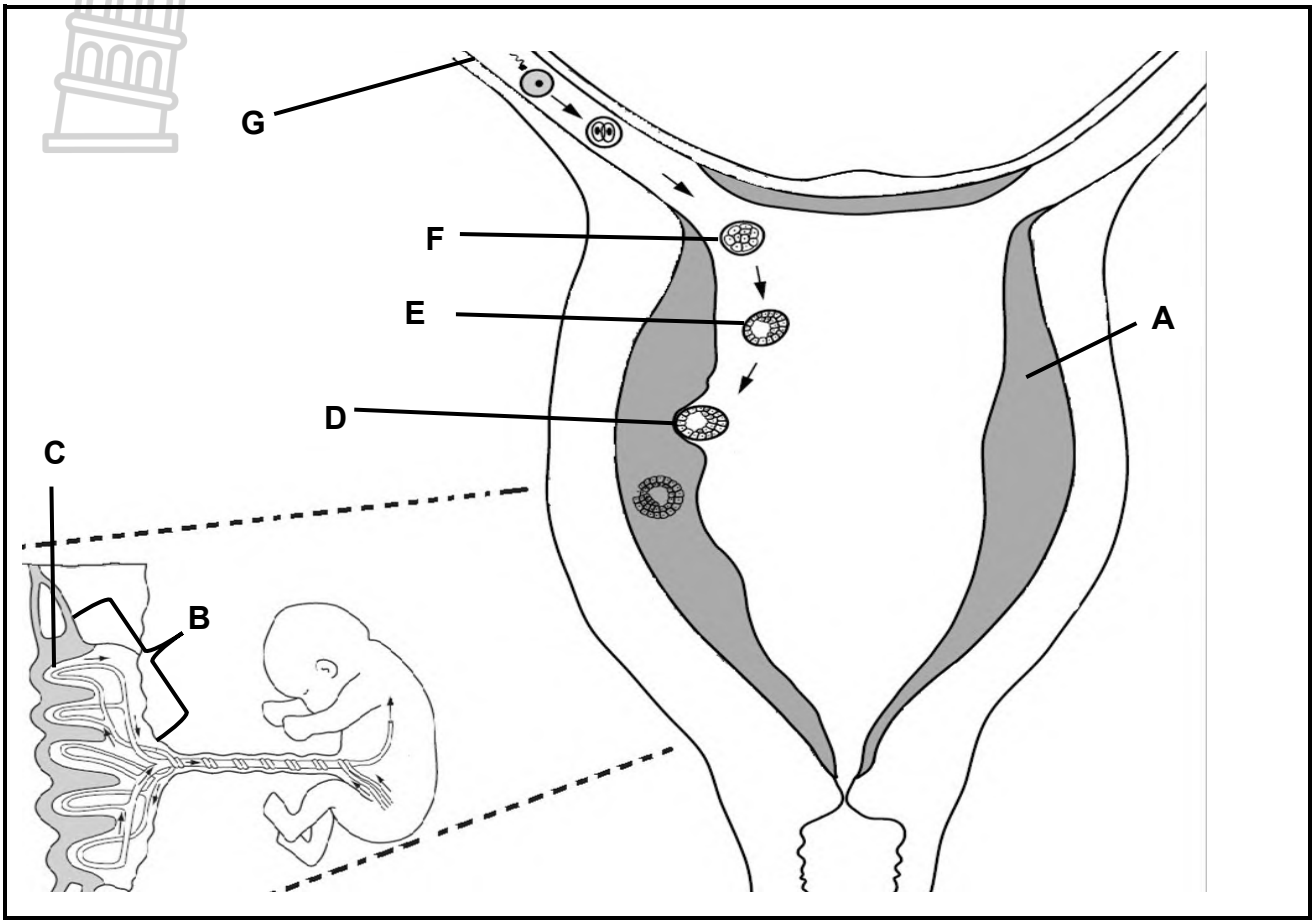
(a) Is the individual experiencing a hot or cold day? (1)

(b) Describe TWO reasons for the answer to QUESTION 2.5.4(a). (4)

[50]

QUESTION 3

3.1 The diagram below is a female reproductive system showing development of zygote to foetus.



3.1.1 Provide labels for:

(a) Process **D** (1)

(b) Structure **F** (1)

3.1.2 Name TWO functions of structure **G**. (2)

3.1.3 Explain how ovarian hormones cause structure **A** to thicken. (2)

3.1.4 Describe THREE functions of structure **B**. (6)

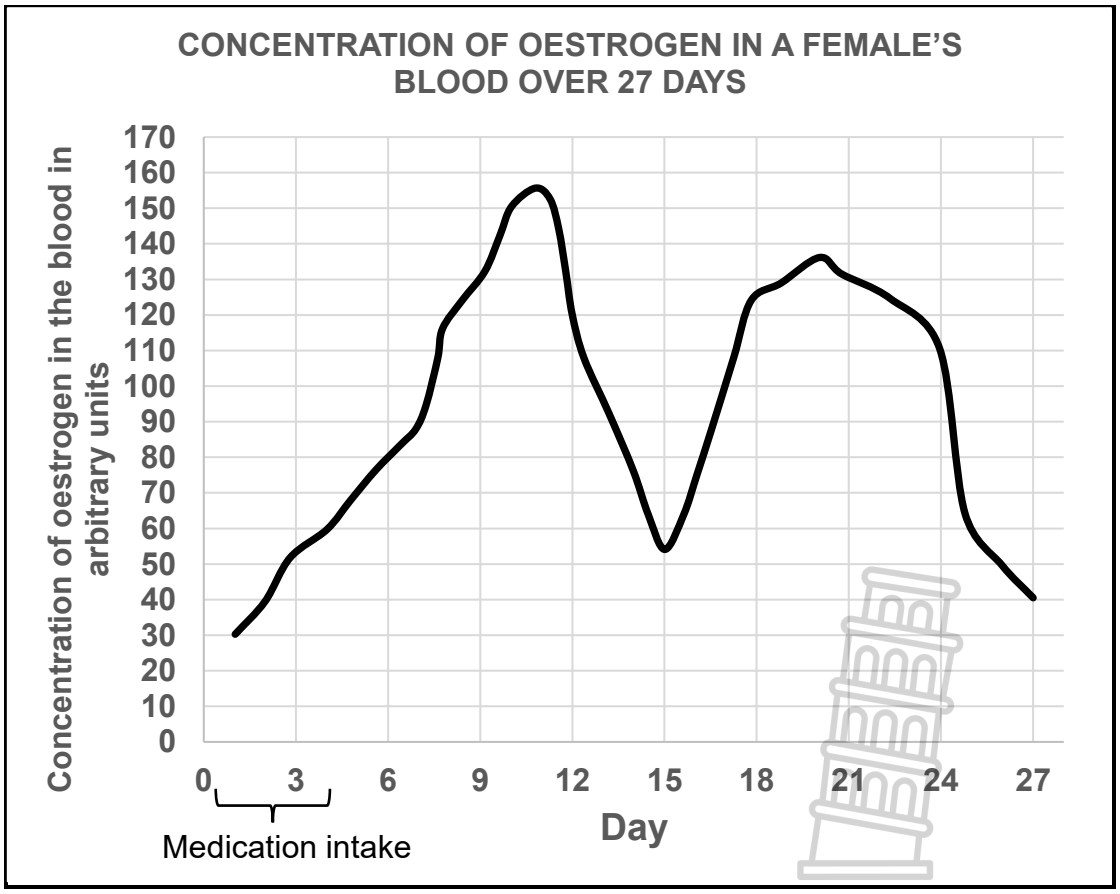
3.1.5 If too few of structure **C** forms, discuss TWO ways this will negatively affect the growth of the foetus. (4)

3.2 Clomiphene is a medication used to treat infertility in women. Researchers wanted to find out how well Clomiphene helps to improve fertility. Clomiphene increases FSH levels, which helps ova grow and be released, improving the chances of pregnancy.

A woman taking clomiphene for infertility was treated for five days. Her blood oestrogen levels were measured every day for 27 days.

The research followed these guidelines:

- The woman had to have low FSH levels, too low for normal ovum production.
- She had to be healthy, without any diseases, and between 18 and 40 years old.
- She could not have a family history of infertility.
- She took 50 g of Clomiphene by mouth each day for 5 days.
- She had to give consent for the study and agree that the researchers would not be responsible for multiple pregnancies.



3.2.1 Name the endocrine gland responsible for FSH secretion. (1)

3.2.2 Identify the independent variable of this investigation. (1)

3.2.3 According to the graph, on which day was the female most fertile? (1)

3.2.4 Explain why researchers used oestrogen levels in the blood to monitor FSH availability in the blood. (2)

3.2.5 Apart from the information stated in the research parameters, list TWO additional planning steps researchers would have needed to consider. (2)

3.2.6 How does repeating the investigation with 25 more women make the results more reliable? (2)

3.2.7 Fertility doctors believe that two ovulation events occurred.

(a) Define *ovulation*. (2)

(b) Discuss why two ovulation events may have occurred. (4)

3.3 Plants regulate their growth and survival through hormones like abscisic acid (ABA) and gibberellins (GA). ABA helps plants respond to stress and enter dormancy, while GA promotes growth.

3.3.1 Name ONE stress response in plants that will result in high ABA levels inducing plant dormancy. (1)

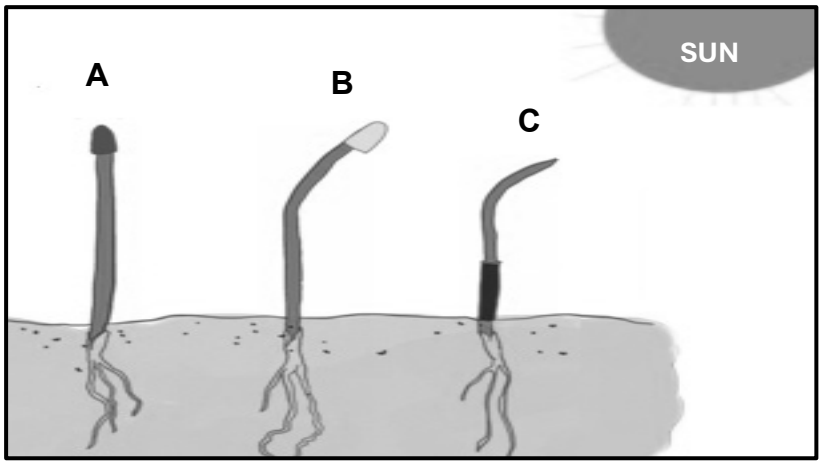
3.3.2 Explain the significance of ABA in a plant during winter. (2)

3.3.3 During which season of the year will GA be the highest? (1)

3.3.4 Describe ONE reason for your answer in QUESTION 3.3.3. (2)

3.4 Researchers investigated how seedlings respond to light by covering different parts of the plant.

- **Seedling A** had a tinfoil covering on its apical meristem
- **Seedling B** had an opaque (semi-transparent) covering on its apical meristem
- **Seedling C** had a tinfoil covering on its lower stem



Describe the reason for the differences in plant growths in seedlings **A** and **C** with references to your observations to the images above. (4)

3.5 Read the extract below.

LINKAGE BETWEEN DIABETES AND ALZHEIMER'S DISEASE

Diabetes and Alzheimer's disease are connected because insulin resistance affects brain function. When insulin doesn't work properly, brain cells struggle to communicate, leading to memory problems. This is why Alzheimer's is sometimes called Type 3 diabetes.
High blood sugar causes inflammation, damages brain cells, and increases harmful proteins called amyloid plaques and tau tangles, which interfere with brain function. Diabetes also damages blood vessels, reducing oxygen and nutrient supply to the brain.
Additionally, excess sugar leads to the production of Advanced Glycation End Products (AGEs), which make plaques and tangles worse. It also increases harmful molecules (Reactive Oxygen Species or ROS), damaging energy production in brain cells.

3.5.1 According to the extract, define *Type 3-diabetes*. (2)

3.5.2 Name TWO Alzheimer proteins that build-up in the brain disrupting its function. (2)

3.5.3 Under normal conditions state the function of insulin in a healthy individual when blood glucose rises above normal. (2)

3.5.4 What would cause glucose levels to remain high? (1)

3.5.5 Describe ONE non-thyroid endocrine hormone that could facilitate in glucose metabolism. (2)

[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150

Province of the
EASTERN CAPE
EDUCATION

Iphondo leMpuma Kapa: Isebe leMfundo
Provinsie van die Oos Kaap: Department van Onderwys
Porofensie Ya Kapa Botjahabela: Lefapha la Thuto

NATIONAL SENIOR CERTIFICATE

GRADE 12

SEPTEMBER 2025

LIFE SCIENCES P1
MARKING GUIDELINE

MARKS: **150**

This marking guideline consists of 11 pages.

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**
   Mark 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, provided it was accepted at the provincial memo discussion meeting.

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

15. **If units are not given in measurements**
Candidates will lose marks. Marking guideline will allocate marks for units separately.

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

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

18. **Code-switching of official languages (terms and concepts)**
A single word or two that appear(s) 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. A marker that is proficient in the relevant official language should be consulted. This is applicable to all official languages.

SECTION A

QUESTION 1

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

1.2.1	Puberty ✓		
1.2.2	Thorns ✓		
1.2.3	(Reproductive) strategy ✓		
1.2.4	Binocular vision ✓		
1.2.5	Testes ✓		
1.2.6	Kidney ✓		
1.2.7	Stimulus ✓		
1.2.8	Chorion ✓		
1.2.9	Multiple Sclerosis ✓	(9 x 1)	(9)

1.3.1	Both A and B ✓✓		
1.3.2	Both A and B ✓✓		
1.3.3	None ✓✓	(3 x 2)	(6)

1.4.1	(a) A ✓ – Prostate gland ✓		(2)
	(b) B ✓ – Epididymis ✓		(2)
1.4.2	- Penis/D deposits sperm directly into the female reproductive tract ✓ during ejaculation, - ensuring that sperm are closer to the egg cell ✓ for potential fertilisation. **(Mark first ONE only)**	(1 x 2)	(2)
1.5.1	(a) Oviparous ✓		(1)
	(b) Allantois ✓		(1)
1.5.2	- The foetus obtains nutrients directly from the mothers' body ✓ - The foetus is protected by the mother's body from the environment ✓ **(Mark first TWO only)**		(2)

1.6.1 (a) TSH/Thyroid stimulating hormone ✓ (1)

(b) Thyroid gland ✓ (1)

(c) Negative feedback ✓ mechanism (1)

1.6.2 (a) Goitre ✓ (1)

(b) Thyroxin ✓ (1)

[50]

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 2.1.1 (a) A – Pinna ✓ (1)

(b) D – Auditory nerve ✓ (1)

2.1.2
- The buildup of fluid in the middle ear increases pressure which reduces the ability of the tympanic membrane (structure E) to vibrate effectively ✓
  As a result, fewer sound vibrations are transmitted to the ossicles (structure B) ✓
- The fluid also restricts the movement of the ossicles, reducing the ability to amplify sound ✓
  This leads to less mechanical vibrations being passed on to the inner ear ✓resulting in the hearing loss. (4)

2.1.3 - Insert grommet✓ (into structure E) (1)

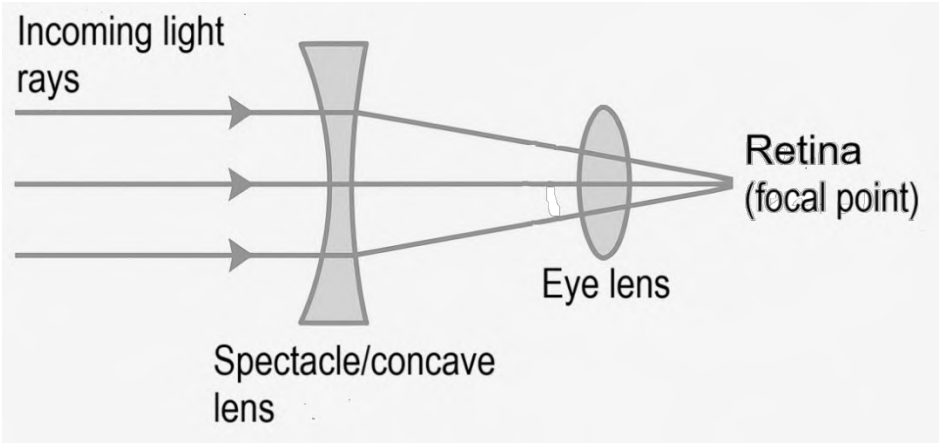
2.1.4 - The use of earplugs to prevent water entry to the middle ear ✓ (1)

2.1.5 The semi-circular canals / structure C:
- Are arranged at (right) angles of each other ✓
  To detect movement in three different planes/ as endolymph is displaced in each receptor(s) are stimulated ✓
- Contain cristae and ampullae ✓
  Detecting the speed of change in rotational movement of the head ✓
- Contain endolymph ✓
  That is displaced with head movement/rotation causing the cupula to bend ✓
  (Mark first TWO only) (2 x 2) (4)

2.2 2.2.1 Accommodation ✓ (1)

2.2.2
- Ciliary muscle relax ✓
- Suspensory ligaments are pulled taught ✓
- Tension on lens increases ✓
- Making the lens become flatter/less convex ✓
  Light rays are refracted (bent) less ✓ (Any 4 x 1) (4)

2.2.3



Marking guideline for drawing

Correct lens shape (concave) - **S**	1 Mark
Incoming light rays - **L**	1 Mark
How the light rays are adjusted (bended) to focus correctly on the retina - **B**	1 Mark

(3)

2.3 2.3.1
- The path an impulse takes ✓ from
- receptor to effector ✓ (2)

2.3.2
- Transmits impulses ✓ from receptors to the brain ✓
- Transmits impulses ✓ from the brain to effectors ✓
- It helps coordinate muscle movements and balance ✓ by transmitting impulses between the brain and body. ✓

(Mark first ONE only) (Max 2) (Any 1 x 2) (2)

2.3.3

B/ Sensory neuron	**D/ Motor neuron**
Unipolar ✓	Multipolar ✓
Enter the spinal cord via the dorsal root ✓	Exit spinal cord via ventral root ✓
(Mark first TWO only)	

Table ✓+ (2 x 2) (5)

2.3.4 Synapse ✓*
- It ensures that the impulse moves in one direction only ✓
- It prevents continuous stimulation of the neurons ✓
- It ensures that the impulse is transmitted from the sensory neuron to the motor neuron

(**Mark first TWO only and ✓***) (3)

2.4 2.4.1 Autonomic nervous system ✓ (1)

2.4.2
- Sympathetic nerve
  Increase cardiac rhythm ✓ increasing ✓blood flow around the body
- Parasympathetic
  Returning ✓ cardiac rhythm back to normal ✓ operating conditions (4)

2.5 2.5.1 Aldosterone ✓ (1)

2.5.2 $\frac{83}{360}$ ✓x 2 600 ✓ = 599,44 ✓ cm^3 (3)

2.5.3
- ADH will travel in the blood to the kidneys/nephron ✓
- Causing an increase in permeability ✓
- Within the collecting ducts/nephron ✓
- More water is absorbed from the filtrate ✓
- Less water is expelled through the urine ✓ (Any 4 x 1) (4)

2.5.4 (a) Cold day ✓ (1)

(b) - High volume of urine produced ✓*
  During a cold day, the body sweats less and produces more, urine to remove extra water ✓
- Little sweat is being produced ✓*
  During a cold day, the body does not need to cool down, so less sweat is produced ✓
  (Mark FIRST TWO only) (2 x 2) (4)

[50]

QUESTION 3

3.1 3.1.1 (a) Implantation ✓ (1)

(b) Morula ✓ (1)

3.1.2
- Facilitate the movement of sperm cells, egg cells and the zygote to the uterus✓/produce peristaltic movements to facilitate movements of sperm, egg and zygote/ to catch and usher ovum into Fallopian tube
- Site of fertilisation ✓
- To keep sperm cells, egg cells and the zygote hydrated ✓/ provides a suitable environment/nourishment for the fertilized ovum (zygote) before it moves to the uterus. (Any 2)

OR

- Helps sperm reach the ovum ✓ for fertilisation ✓
- To keep sperm cells, egg cells and the zygote hydrated ✓/ provides a suitable environment/nourishment for the fertilized ovum (zygote) before it moves to the uterus. (Any 2) (2)

3.1.3
- The hormones, estrogen and progesterone ✓* cause the endometrium to become
- more vascular ✓
- more glandular
increasing the endometrium lining size – more glandular ✓
(Mark ✓* + Any 1 only) (2)

3.1.4
- Nutrition ✓
It allows for diffusion of nutrients from the mother to the foetus ✓
- Gaseous exchange ✓
Diffusion of oxygen from the mother to the foetus and for the diffusion of carbon dioxide from the foetus to the mother ✓
- diffusion of waste products and nutrients ✓
from the foetus to the mother ✓
- Endocrine function ✓
After 12 weeks, the placenta secretes progesterone to maintain the pregnancy ✓
- Acts as a microfilter ✓
Preventing pathogenic microbes and certain toxins from entering into foetal blood.
(Mark first THREE only) (3 x 2) (6)

3.1.5 - Limited nutrition, ✓ the developing foetus will not be able to receive enough nutrients and oxygen ✓
- Toxicity ✓ might build up in the foetus as there will be limited removal of metabolic waste products ✓
(Mark first TWO only) (2 x 2) (4)

3.2 3.2.1 Pituitary/hypophysis ✓ gland (1)

3.2.2 Clomiphene treatment ✓ (1)

3.2.3 - Day 10/11 ✓ (1)

3.2.4 - FSH cause the development of mature Graafian follicle. ✓
- As a Graafian follicle grows, it secretes more oestrogen. ✓
- Therefore, rising oestrogen levels indicate that FSH is active and functioning. ✓ (2)

3.2.5 - Acquiring research tools/instruments ✓ to collect data with
- Deciding on how data will be recorded ✓ (2)

3.2.6 - Allowing researchers to identify trends ✓
- Reduces effects of random errors ✓ /outliers
- Improves accuracy of results ✓ (Any TWO) (2)

3.2.7 (a) The release of a (mature) ovum ✓ from the ovary/mature Graafian follicle ✓ (2)

(b) - Oestrogen levels peaked/drastically increased twice, ✓
- Once at day 10 and the other at day 20 ✓
- Oestrogen is secreted from developing follicles ✓ and
- the greater the size of the Graafian follicle, the greater amount of oestrogen secreted ✓
- Oestrogen levels usually spike the day before ovulation, it spiked twice within 27 days. ✓ (Any FOUR) (4)

3.3 3.3.1 - Decreased water availability/drought ✓
- Parasitism ✓
- Decreased light intensity ✓
- Coldness ✓
- Increased transpiration ✓ (Any ONE) (1)

3.3.2 - Inhibits plant growth in unfavourable conditions ✓
- Preventing the plant from expending energy where it might not be able to photosynthesise efficiently. ✓ (2)

3.3.3 Spring / Summer ✓ (1)

3.3.4 - Higher UV radiation will be available, plants will be able to photosynthesise better ✓
- GA stimulates cell elongation/plant growth/flowering to harness increased environmental energy ✓ (2)

3.4 In seedling A
- Auxins produced in the apical meristem
- Could not detect light direction ✓
- And remained evenly distributed ✓
- Causing the seedling to grow upwards ✓ (Any TWO) (2)

In seedling C
- Auxins produced in the apical meristem
- Where unevenly distributed ✓
- Accumulating on the left-hand side, causing cell elongation ✓
- Causing the seedling to bend towards the right ✓ (Any TWO) (2)

3.5 3.5.1 When insulin doesn't work properly, brain cells struggle to communicate, leading to memory problems. ✓✓ (2)

3.5.2 - amyloid plaques ✓
- tau tangles ✓ (2)

3.5.3 - Insulin will stimulate liver / hepatic / muscle cells ✓
- To convert excess glucose to glycogen ✓ which is stored in them (2)

3.5.4 - Insulin Resistance ✓

OR

- The body being unable to convert glucose to glycogen ✓ despite the secretion of insulin into the blood (1)

3.5.5 - Adrenalin ✓
- Could cause an increase in cellular respiration within cells, thus uptake of glucose ✓ (2)

[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150