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DEPARTMENT OF EDUCATION
DEPARTEMENT VAN ONDERWYS
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ISEBE LEZEMFUNDO

# PROVINSIALE VOORBEREIDENDE EKSAMEN/ PROVINCIAL PREPARATORY EXAMINATION

## GRAAD/GRADE 12

## LEWENSWETENSKAPPE/LIFE SCIENCES

## VRAESTEL/PAPER 1

## SEPTEMBER 2025

**PUNTE/MARKS: 150**

**TYD/TIME: 2½ uur/hours**

**Hierdie vraestel bestaan uit 16 bladsye.**
**This question paper consists of 16 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 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 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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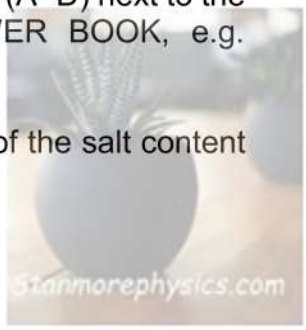
## SECTION A

## QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, e.g. 1.1.11 D.




1.1.1 The hormone responsible for the regulation of the salt content in the human body is …

A testosterone.
B aldosterone.
C prolactin.
D glucagon.

1.1.2 The plant hormone(s) that can be used to kill broad-leaved weeds are …

A abscisic acid only.
B absicisic acid and gibberellins.
C auxins only.
D abscisic acid and auxins.

1.1.3 Which ONE of the following effects occurs under the influence of adrenalin?

A Decreased blood pressure
B An increased blood supply to the digestive system
C An increased blood supply to the skeletal muscles
D Decreased muscle tone of skeletal muscles.

1.1.4 Which part of the ear contains the receptors for balance?

A Semi-circular canals
B Oval window
C Tympanic membrane
D Cochlea

1.1.5 Which ONE of the following is a function of amniotic fluid?

A Protects the foetus from temperature changes
B Transports oxygen to the developing foetus
C Produces progesterone and oestrogen
D Diffusion of dissolved nutrients from the mother to the foetus

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1.1.6 During a reflex action, impulses enter the spinal cord via the …

A sensory neuron through the dorsal root of the spinal nerve.
B sensory neuron through the ventral root of the spinal nerve.
C interneuron through the ventral root of the spinal nerve.
D interneuron through the dorsal root of the spinal nerve.

1.1.7 An investigation was conducted to determine the effect of alcohol on reaction time.

The procedure was as follows:

- Fifty volunteers were selected.
- The volunteers' reaction time was measured at the beginning of the investigation.
- They were each given alcohol to drink.
- Their reaction times were measured again after 30 minutes.

The following factors were considered during the investigation:

(i) Age of volunteers
(ii) Number of volunteers
(iii) The amount of alcohol taken in
(iv) Tool used to measure reaction time

Which combination of factors will affect the validity of the investigation?

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

1.1.8 Which ONE of the following is a stage in human embryonic development?

A Choroid
B Amnion
C Chorion
D Morula

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1.1.9 Grommets are used in the treatment of …

A deafness.
B blindness.
C middle-ear infections.
D multiple sclerosis.

1.1.10 A person produces a smaller volume of urine because …

A ADH levels are low in the blood and the renal tubules are more permeable to water.
B ADH levels are high in the blood and the renal tubules are less permeable to water.
C ADH levels are high in the blood and the renal tubules are more permeable to water.
D ADH levels are low in the blood and the renal tubules are less permeable to water.

(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 1.2.8) in the ANSWER BOOK.

1.2.1 The type of egg produced by reptiles that has extra-embryonic membranes

1.2.2 The microscopic gap between two consecutive neurons

1.2.3 The stage of development when secondary sexual characteristics develop in males and females

1.2.4 The release of an ovum from the ovary

1.2.5 The part of the autonomic nervous system that prepares the body for an emergency

1.2.6 The hormone that controls normal growth and development of the skeleton and the muscles

1.2.7 The type of development in birds where the hatchlings' eyes are open and their bodies are covered with down feathers

1.2.8 A plant hormone that stimulates the germination of seeds

(8 x 1) **(8)**

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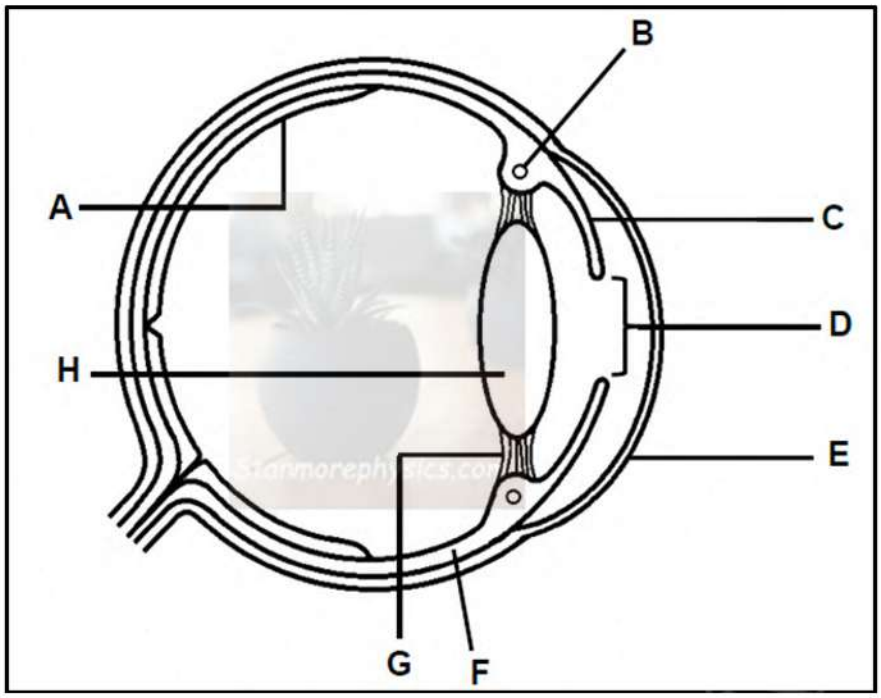
1.3 Indicate whether each of the descriptions in COLUMN I apply to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **Both A and B** or **none** next to the question numbers (1.3.1 to 1.3.3) in the ANSWER BOOK.

| | COLUMN I | COLUMN II |
|---|---|---|
| 1.3.1 | A plant's defence mechanism against pathogens | A: Chemicals<br>B: Thorns |
| 1.3.2 | Regulation of water in the body | A: Hypothalamus<br>B: Corpus callosum |
| 1.3.3 | Gland(s) that secrete(s) its secretions directly into the bloodstream | A: Endocrine<br>B: Exocrine |

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

1.4 The diagram below represents the structure of the human eye.




1.4.1 Identify part **G**. (1)

1.4.2 Give the function of part **D**. (1)

1.4.3 Give the LETTER and the NAME of the structure that:

(a) Supplies food and oxygen to the eye (2)

(b) Contains rods and cones (2)

1.4.4 Name the defect caused when part **H** becomes cloudy and opaque. (1)
**(7)**

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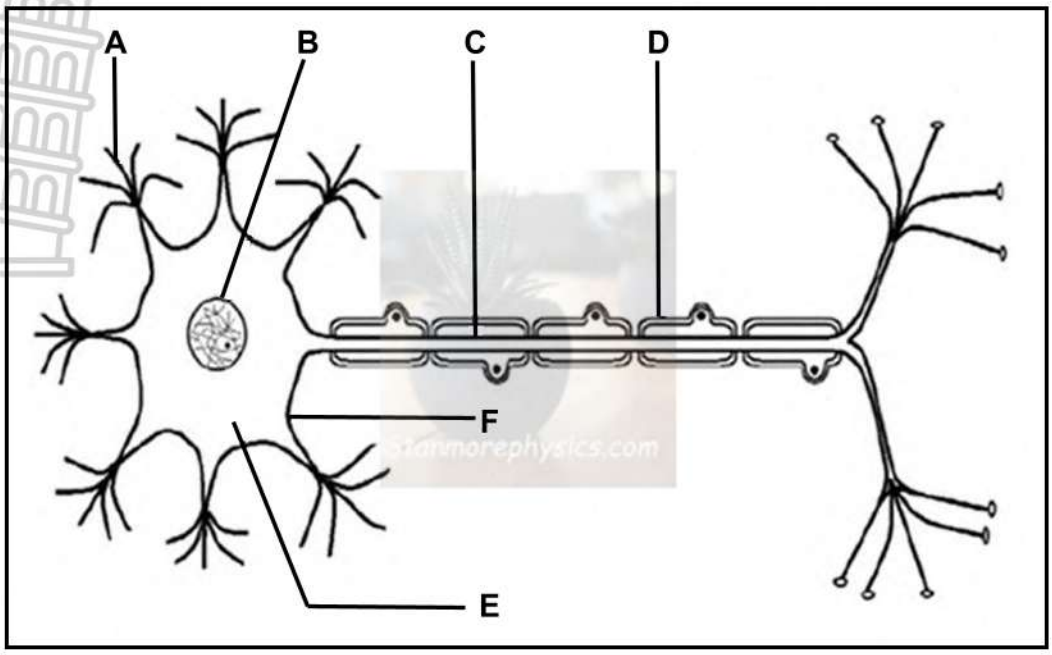
1.5 The diagram below represents the structure of a neuron.




1.5.1 Name the type of neuron in the diagram. (1)

1.5.2 Give TWO visible reasons for your answer to QUESTION 1.5.1. (2)

1.5.3 Identify:

(a) Part **C** (1)

(b) Organelle **B** (1)

1.5.4 Give the LETTER and NAME of the part that transmits impulses to the cell body. (2)

1.5.5 List TWO effectors in the human body. (2)
**(9)**

**TOTAL SECTION A: 50**

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## SECTION B

## QUESTION 2

2.1 Read the extract below.

**ROMANCE OF THE SEAS: STRANGE MATING HABITS OF THE SEAHORSE**

The male and female seahorse come together repeatedly every morning to dance together. They change color as they move together, sometimes with tails entwined.

Seahorses display internal fertilisation. During mating, the female seahorse deposits her pear-shaped egg cells into the male's brood pouch, a specialised structure on his abdomen. Inside this pouch, the male fertilises the egg cells and provides a safe environment for the developing embryos. The walls of the brood pouch have a rich blood supply and provide oxygen and nutrients to the embryos, but the developing young are nourished mainly by their egg yolk.

This mode of reproduction is called ovovivipary, in which embryos develop inside eggs retained within the parent's body until they hatch internally or just before birth. The male then gives birth to tiny, fully independent offspring.

Shortly after the male gives birth, the female already has new egg cells ready, so they can mate again right away. This increases the chances of successful fertilisation and rapid reproduction.

2.1.1 Fertilisation in seahorses takes place internally.

State TWO advantages of internal fertilisation. (2)

2.1.2 Name TWO ways, apart from nutrition, in which the developing embryos benefit from the brood pouch of the male seahorse. (2)

2.1.3 Explain ONE manner in which the chances of survival are increased in seahorses. (2)
**(6)**

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2.2 An investigation was conducted to compare the concentration of glucose in the blood of two people, Mo and Dan, before and after ingesting glucose.

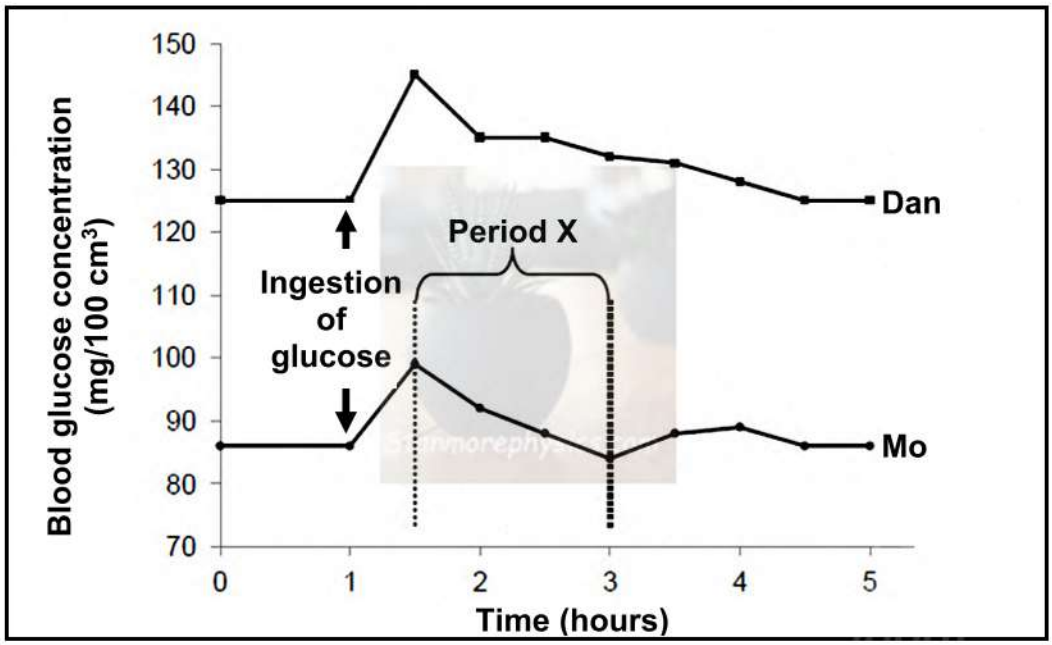
The procedure was as follows:

- The glucose concentration in their blood was measured at the start of the investigation and again ONE hour into the investigation.
- One hour into the investigation, each of them was given 50 mℓ of a glucose solution to drink.
- For the next FOUR hours after ingesting the glucose solution, the glucose concentration in their blood was measured every 30 minutes.

The results are shown in the graph below.
The **arrows** indicate when they drank the glucose solution.

**NOTE**:

- The normal glucose concentration in blood is between 80 and 120mg/100 $cm^3$.




2.2.1 State the aim of this investigation. (1)

2.2.2 Calculate the increase in Dan's blood glucose level (in mg/100 $cm^3$) after drinking the glucose solution. Show ALL calculations. (2)

2.2.3 Identify the person (Dan or Mo) who has diabetes mellitus. (1)

2.2.4 Give ONE reason why a person with untreated diabetes mellitus is expected to be tired all the time. (2)

2.2.5 Describe how the changes in Mo's blood glucose levels are regulated during period **X**. (4)
**(10)**

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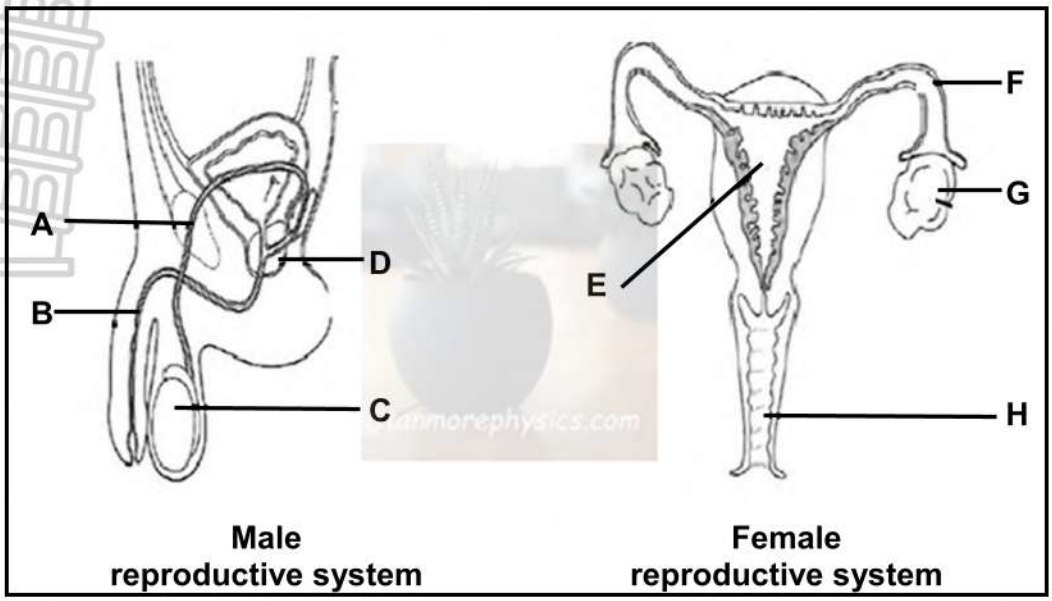
2.3 The diagram below shows the male and female reproductive systems.




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

2.3.2 Name the process that takes place in **F**. (1)

2.3.3 Describe how the secretions of gland **D** provide protection for the sperm from the conditions in part **H**. (2)

2.3.4 A vasectomy is when part **B** is surgically cut.

Explain why this man will NOT be able to reproduce after this procedure. (3)

2.3.5 Describe the type of gametogenesis that take place at **G**. (5)

2.3.6 Draw a labelled diagram of the gametes found in **C**. (4)
**(16)**

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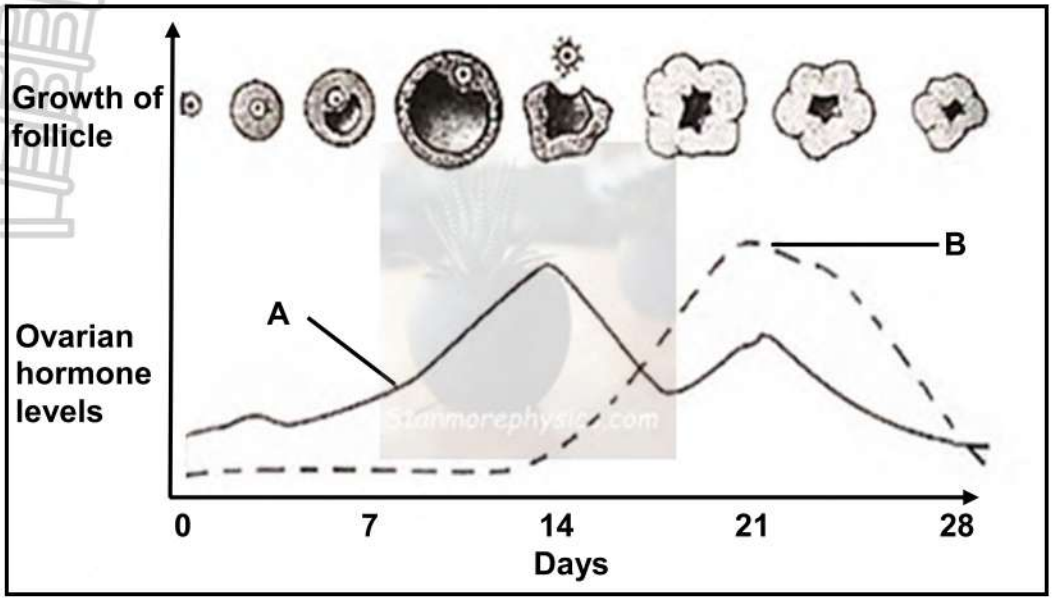
2.4 The diagram below represents the growth of a follicle and the ovarian hormone levels.




2.4.1 Identify hormone **B**. (1)

2.4.2 Name the follicle responsible for secreting hormone **A**. (1)

2.4.3 Give evidence from the graph that indicates that fertilisation did not take place. (2)

2.4.4 Describe the process that takes place in the uterus after fertilisation did not occur. (4)
**(8)**

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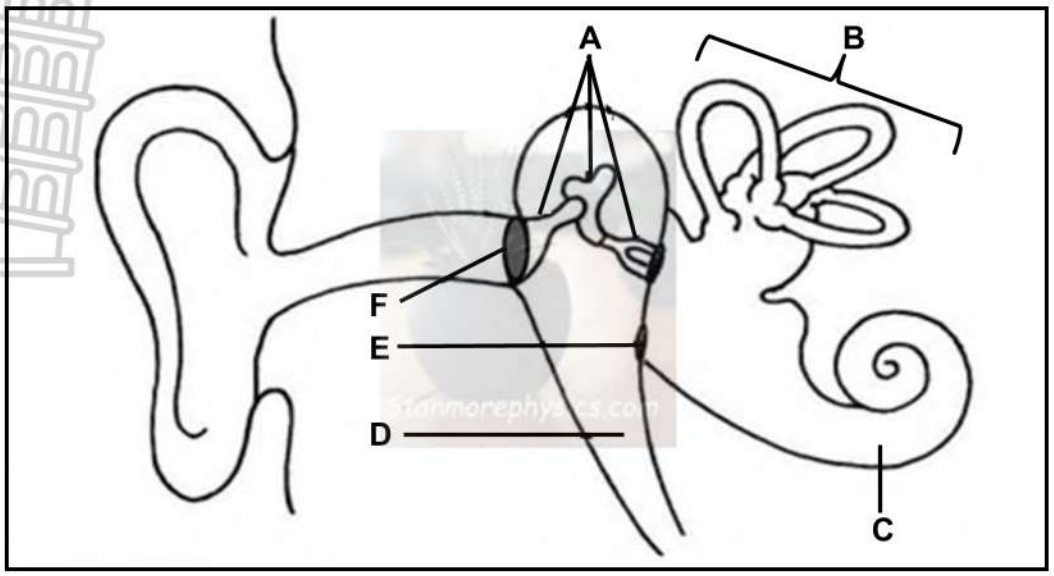
2.5 The diagram below represents the human ear.




2.5.1 Name the part of the brain that receives impulses from:

(a) Part **B** (1)

(b) Part **C** (1)

2.5.2 Explain how the fusion of the structures at **A** may lead to hearing loss. (5)

2.5.3 Describe how an increased production of mucus in the nose and throat may lead to the bursting of part **F.** (3)

**(10)**

**[50]**

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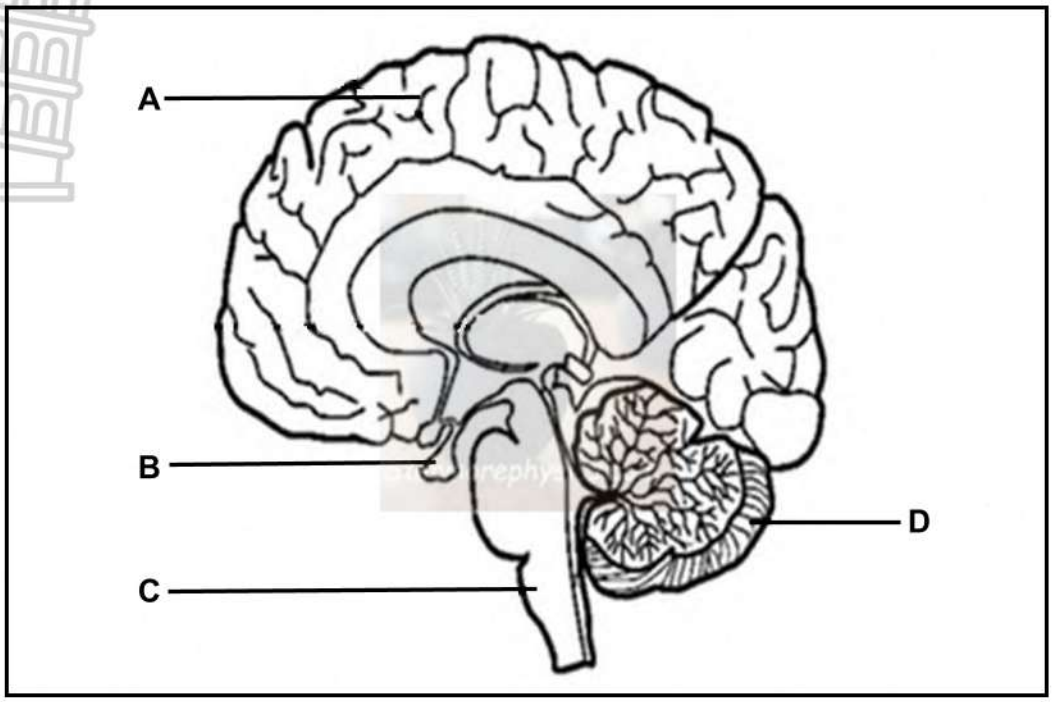
**QUESTION 3**

3.1 The diagram below shows the human brain.




3.1.1 Identify part **D**. (1)

3.1.2 Give the LETTER and NAME of the part of the brain that has the centre for interpreting taste. (2)

3.1.3 Name ONE way how the brain is protected. (1)

3.1.4 Explain how the body would be affected if part **B** did not secrete TSH. (3)

3.1.5 Describe how part **C** restores the carbon dioxide concentration in the blood when it rises above normal levels. (5)
**(12)**

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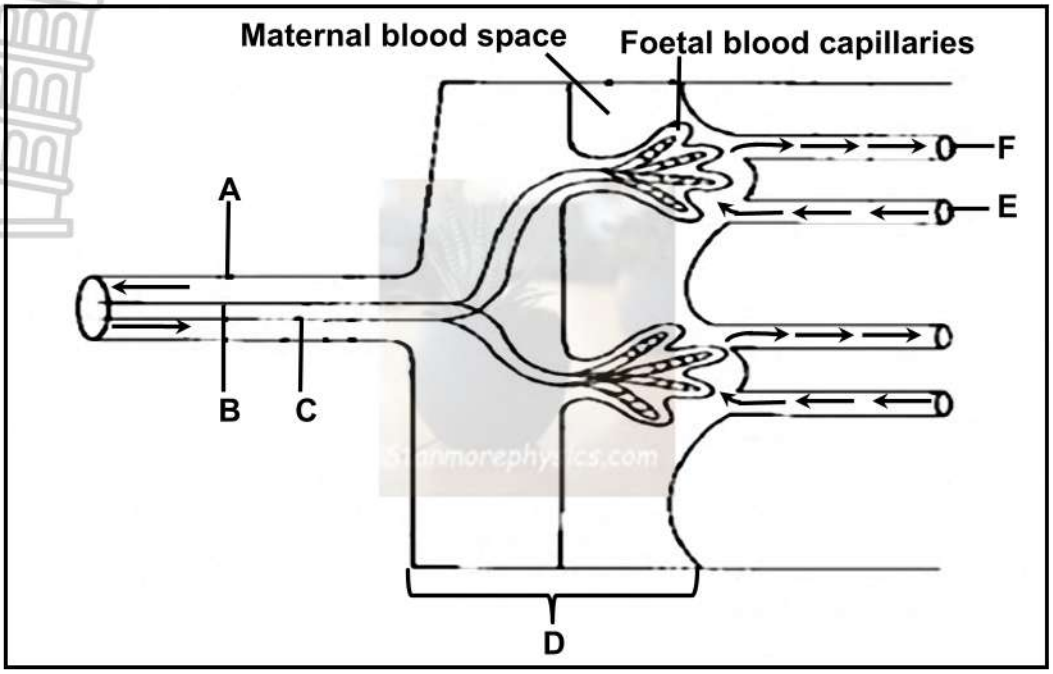
3.2 The diagram below shows the circulation of blood in the endometrium of a pregnant woman. The arrows indicate the direction of the flow of blood.




3.2.1 Identify structure **A**. (1)

3.2.2 Name the process that enables the exchange of substances between the maternal blood space and the foetal blood capillaries. (1)

3.2.3 Name ONE hormone that prepares part **D** for implantation. (1)

3.2.4 Explain ONE negative consequence on foetal development if part **D** is reduced significantly. (2)

3.2.5 Tabulate TWO differences in the composition of blood flowing to and from the foetus in blood vessels **B** and **C**. (5)
**(10)**

3.3 Describe how the human skin maintains the body temperature when the environmental temperature is 40 ºC. **(5)**

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3.4 A person sitting in a darkened room covers one eye. A dim electric bulb, positioned at varying distances from the person, is switched on for a period of 9 seconds at one-minute intervals. During this period, the diameter of the pupil of the eye is measured every second.

The results obtained are shown in the table below.

| **Time interval (seconds)** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** |
|---|---|---|---|---|---|---|---|---|---|
| **Diameter of pupil (mm)** | 2 | 4 | 5 | 5 | 8 | 7 | 3 | 1 | 6 |

3.4.1 Identify the TWO consecutive intervals when the pupil's diameter decreased the most. (2)

3.4.2 Describe how the size of the pupil changes from interval **8** to interval **9**. (4)

3.4.3 Describe why the answer to QUESTION 3.4.2 is a reflex action. (2)

3.4.4 State ONE way in which the investigator could ensure that the results of the investigation are reliable. (1)

3.4.5 Draw a line graph to represent the data shown in the table (6)
**(15)**

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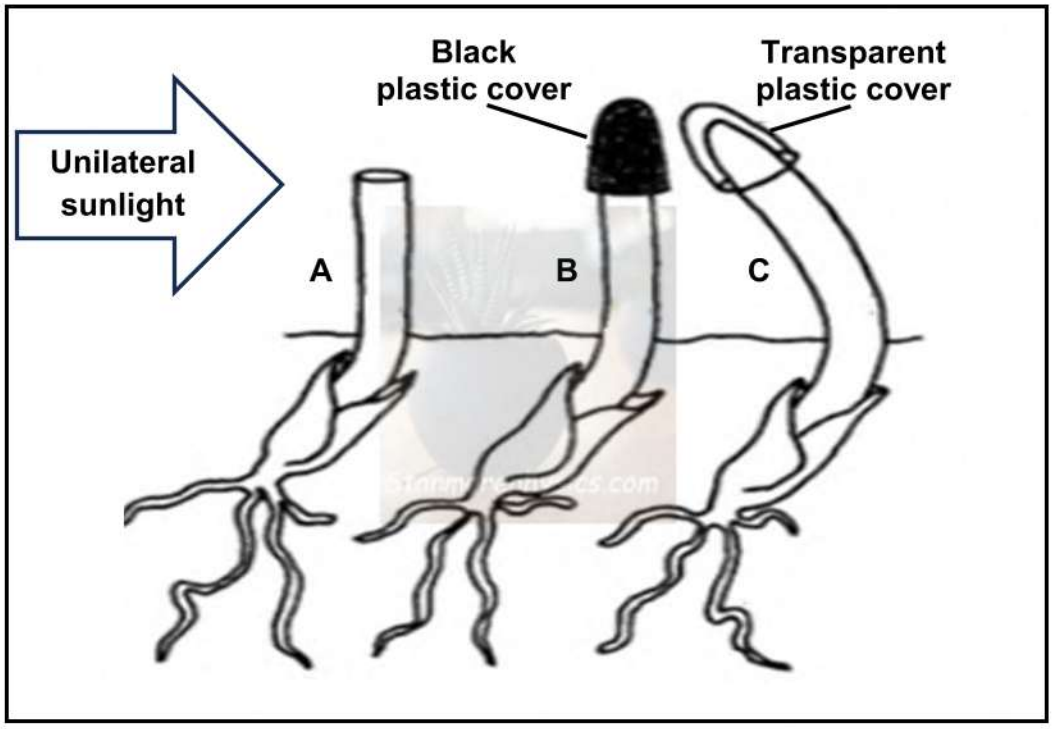
3.5 The diagram below shows the results of an investigation carried out to determine the effect of a plant hormone on the growth of coleoptiles (young shoots).

The procedure was as follows:

- Three coleoptiles were used.
- Coleoptile **A** had its apical bud removed.
- Coleoptile **B** had its apical bud covered with a black plastic cover.
- Coleoptile **C** had its apical bud covered with a transparent plastic cover.
- All three coleoptiles (**A**, **B** and **C**) were then exposed to unilateral sunlight.




3.5.1 Name the type of tropism that is observed. (1)

3.5.2 Name the plant hormone responsible for the type of tropism mentioned in QUESTION 3.5.1. (1)

3.5.3 Explain the results obtained in coleoptile **C**. (4)

3.5.4 Explain why lateral branches will develop in coleoptile **A**. (2)
**(8)**
**[50]**

**TOTAL SECTION B: 100**
**GRAND TOTAL: 150**

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# PROVINCIAL PREPARATORY EXAMINATION

## GRADE 12

## LIFE SCIENCES

## PAPER 1

## SEPTEMBER 2025

## MARKING GUIDELINES

**MARKS: 150**

**These marking guidelines consist of 10 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 are 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 part of it is required**
   Read all and credit relevant part.

4. **If comparisons are asked for but descriptions are given**
   Accept if 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 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 national memo discussion meeting.

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

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15. **If units are not given in measurements**
Candidates will lose marks. Memorandum 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, drawings, graphs, tables, etc.) must have a caption.

18. **Code-switching of official languages (terms and concepts)**
A single word or two that appears in any official language other than the learner's assessment language used to the greatest extent in his/her answers should be credited, provided it is correct. A marker that is proficient in the relevant official language should be consulted. This is applicable to all official languages.

19. **Changes to the marking guidelines**
No changes must be made to the marking guidelines without consent of examiner and moderator.




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## SECTION A

## QUESTION 1

| | | | | |
|---|---|---|---|---|
| 1.1 | 1.1.1 | B ✓✓ | | |
| | 1.1.2 | C ✓✓ | | |
| | 1.1.3 | C ✓✓ | | |
| | 1.1.4 | A ✓✓ | | |
| | 1.1.5 | A ✓✓ | | |
| | 1.1.6 | A ✓✓ | | |
| | 1.1.7 | B ✓✓ | | |
| | 1.1.8 | D ✓✓ | | |
| | 1.1.9 | C ✓✓ | | |
| | 1.1.10 | C ✓✓ | (10 x 2) | **(20)** |
| 1.2 | 1.2.1 | Amniotic ✓ egg | | |
| | 1.2.2 | Synapse ✓/Synaptic gap | | |
| | 1.2.3 | Puberty ✓ | | |
| | 1.2.4 | Ovulation ✓ | | |
| | 1.2.5 | Sympathetic ✓ nervous system | | |
| | 1.2.6 | Growth hormone ✓ **(DO NOT ACCEPT 'GH')** | | |
| | 1.2.7 | Precocial ✓ development | | |
| | 1.2.8 | Gibberellins ✓ | (8 x 1) | **(8)** |
| 1.3 | 1.3.1 | A only ✓✓ | | |
| | 1.3.2 | A only ✓✓ | | |
| | 1.3.3 | A only ✓✓ | (3 x 2) | **(6)** |
| 1.4 | 1.4.1 | Suspensory ligaments ✓ | | (1) |
| | 1.4.2 | Allows light to enter the eye ✓ | | (1) |
| | 1.4.3 | (a) F ✓ - Choroid ✓ | | (2) |
| | | (b) A ✓ - Retina ✓ | | (2) |
| | 1.4.4 | Cataracts ✓ | | (1) |
| | | | | **(7)** |
| 1.5 | 1.5.1 | Moto r✓ neuron/efferent | | (1) |
| | 1.5.2 | - Has **many** dendrites ✓<br>- Cell body is at the one end of the neuron ✓<br>- Only the axon has a myelin sheath ✓<br>**(Mark first TWO only)** | Any | (2) |
| | 1.5.3 | (a) Axon ✓ | | (1) |
| | | (b) Nucleus ✓ | | (1) |
| | 1.5.4 | A ✓ - Dendrites ✓ | | (2) |
| | 1.5.5 | Muscle(s) ✓ and gland(s) ✓ | | (2) |
| | | | | **(9)** |

**TOTAL SECTION A: 50**

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**SECTION B**

**QUESTION 2**

2.1 2.1.1
- It increases chances of fertilisation ✓
- Gametes are protected from predation ✓ /environmental factors/dessication
- Water is not needed ✓
- Fewer gametes are needed ✓
- The male and female gametes are in close proximity ✓/ gametes are in close contact

Any (2)

2.1.2
- Provides a safe environment ✓ for development
- Supplies oxygen ✓ (2)

2.1.3
- Female has ova ready ✓ to mate again after male gives birth ✓ which lead to increased chances of survival
- Internal fertilization ✓ where the gametes are protected ✓
- Organisms develop before they hatch ✓ in the pouch and are independent ✓

**(Mark first ONE only)** (2 x 1) (2)
**(6)**

2.2 2.2.1 To compare the concentration of glucose in the blood of two people/Mo and Dan before and after ingesting glucose. ✓ (1)

2.2.2 145 – 125 ✓ = 20 ✓ mg/100cm$^3$
(Accept numbers in range of 144 - 146 for the first value)
(Accept numbers in range of 124 - 126 for the second value) (2)

2.2.3 Dan ✓ (1)

2.2.4
- Not enough glucose is broken down ✓/energy (ATP)
- during cellular respiration ✓ (2)

2.2.5
- The high glucose level ✓/99/98/100 cm$^3$
- stimulates the pancreas ✓/islets of Langerhans
- to secrete insulin ✓ into the blood
- that stimulate liver/muscle cells ✓
- to convert glucose into glycogen ✓ in the liver and muscle cells
- decreasing the blood glucose levels ✓

Any (4)
**(10)**

2.3 2.3.1 Vagina ✓ (1)

2.3.2 Fertilisation ✓ (1)

2.3.3 The secretion is alkaline ✓/a base fluid which neutralises the acidic ✓ conditions of the vagina/part **H** (2)

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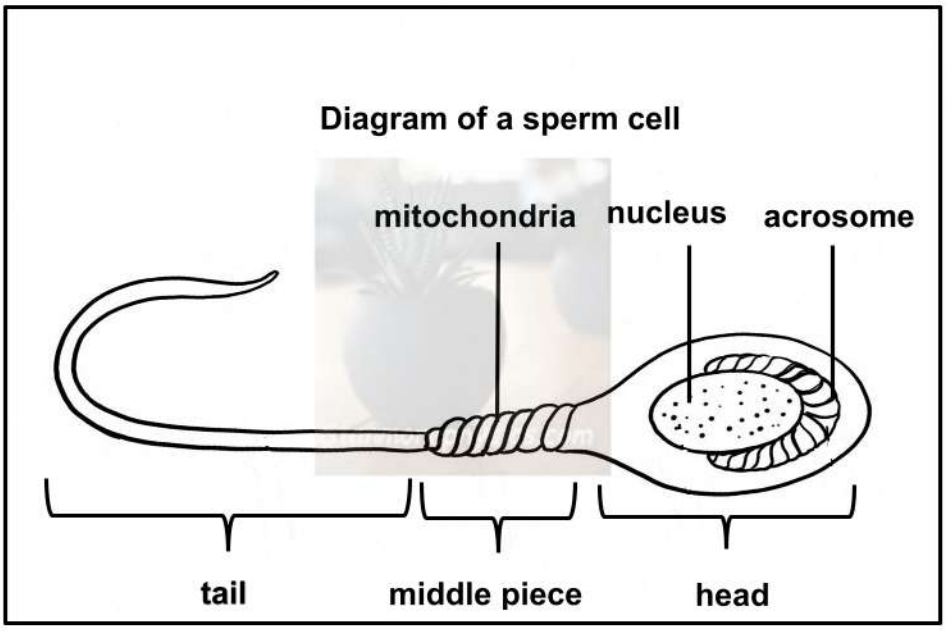
2.3.4
- The sperm will not be able to reach the urethra ✓
- therefore, no sperm in the semen ✓
- and no fertilisation will take place ✓ (3)

2.3.5
- Oogenesis ✓
- Diploid cells/germinal epithelial cells in the ovary undergo mitosis ✓
- to form numerous follicles. ✓
- At the onset of puberty ✓
- and under the influence of FSH, ✓
- one cell inside a follicle enlarges and undergoes meiosis. ✓
- Of the four cells that are produced, only one survives to form a mature, **haploid** ovum. ✓
- This occurs in a monthly cycle. ✓ Any (5)

2.3.6




| Criteria for marking the diagram | |
|---|---|
| **Criteria** | **Marks** |
| Caption (**C**) | 1 |
| Correct diagram (**D**) | 1 |
| Any TWO correct labels (**L**) | 2 |

(4)
**(16)**

2.4 2.4.1 Progesterone ✓ (1)

2.4.2 Graafian (follicle) ✓ (1)

2.4.3
- As the corpus luteum degenerated ✓/shrinks
- the progesterone levels decreased to the end of 28 days ✓/after day 21 (2)

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2.4.4
- corpus luteum disintegrates ✓
- progesterone levels drop ✓
- causing the endometrium breaks down ✓/sheds/is no longer maintained
- and menstruation occurs ✓ (4)

**(8)**

2.5 2.5.1 (a) Cerebellum ✓ (1)

(b) Cerebrum ✓ (1)

2.5.2
- The ossicles/structures at **A** will not be able to vibrate. ✓
- No/less amplification of the vibrations can occur. ✓
- No/less vibrations will be passed on to the cochlea. ✓ **(Not 'inner ear')**
- No/less pressure waves can be converted into impulses by the **organ of Corti ✓/hair cells**.
- No/less impulses will be sent to the **cerebrum** ✓ Any (5)

2.5.3
- The mucus will block the Eustachian tube. ✓
- Air cannot equalise pressure on both sides of the tympanic membrane ✓/causing imbalance in pressure.
- The uneven pressure could burst the **tympanic membrane** ✓ (3)

**(10)**
**[50]**

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**QUESTION 3**

3.1 3.1.1 Cerebellum ✓ (1)

3.1.2 A ✓ - Cerebrum ✓ (2)

3.1.3
- Meninges✓
- Cranium (**NO MARK for 'skull'**)
- Cerebrospinal fluid

**(Mark first ONE only)** Any (1)

3.1.4
- The thyroid* gland will not be stimulated ✓
- to secrete thyroxine ✓
- Thyroxine levels will decrease ✓/remain low
- The basal metabolic rate ✓/ rate of respiration will decrease
- Leading to an increase in body mass/obesity* ✓/decrease in body temperature

(2* compulsory marks + any 1) (3)

3.1.5
- Receptor cells ✓
- in the carotid artery ✓/aorta is stimulated
- to send impulses to the medulla oblongata ✓ in the brain
- which then stimulates the heart to beat faster ✓
- and breathing muscles/(diaphragm and intercostal muscles) to contract more ✓
- This increases the rate and depth of breathing ✓
- More $CO_2$ is taken to and exhaled from the lungs ✓
- The $CO_2$ levels in the blood decrease ✓ and return to normal

Any (5)
**(12)**

3.2 3.2.1 Umbilical cord ✓ (1)

3.2.2 Diffusion ✓ (1)

3.2.3 Oestrogen ✓
Progesterone ✓
**(Mark first ONE only)** (1)

3.2.4
- The foetus will receive less nutrients ✓
- and therefore, have a lower birth mass ✓/physical under-development/mental underdevelopment/death

**OR**

- The foetus will receive less oxygen ✓
- and therefore, have a lower birth mass ✓/physical under-development/mental underdevelopment/death

**OR**

- Waste will accumulate ✓
- and it will affect the functioning of the foetus ✓/death

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

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3.2.5

| Blood to the foetus/B | Blood away from the foetus/C |
|---|---|
| Contains high concentration of nutrients ✓/any example | Contains low concentration of nutrients ✓/any example |
| Contains no (metabolic) waste products ✓/urea | Contains high concentration of (metabolic) waste products ✓/ urea |
| Contains high concentration of oxygen ✓ | Contains low concentration of oxygen ✓ |
| Contains low concentration of carbon dioxide ✓ | Contains high concentration of carbon dioxide ✓ |

**(Mark first TWO only)**
**(Differences must correlate)**
**(One mark for table)** (5)
**(11)**

3.3
- Receptors detect ✓ the high temperature and
- stimulate the hypothalamus ✓
- and send impulses to the **blood vessels of the skin**. ✓
- Blood vessels in the skin dilate ✓/vasodilation
- **More** blood flows to the **skin** ✓
- **More** heat is lost ✓ through radiation
- An impulse is sent to the sweat glands ✓
- Sweat glands become **more** active ✓/released more sweat
- **More** heat is lost (from the skin) through evaporation ✓ Any **(5)**

3.4 3.4.1 6 ✓ to 7 ✓ (2)

3.4.2
- Radial muscles of **iris** ✓ contract ✓
- Circular muscles ✓ of the iris relax ✓
- Pupil dilates ✓ (compulsory* 1 mark + any 3) (4)

3.4.3
- it is a quick **and** automatic/involuntarily response ✓
- to a light ✓ stimulus (2)

3.4.4
- Repeat the investigation ✓
- Use persons ✓ to sit in the dark Any (1)

**(DO NOT ACCEPT 'CALCULATE THE AVERAGE')**

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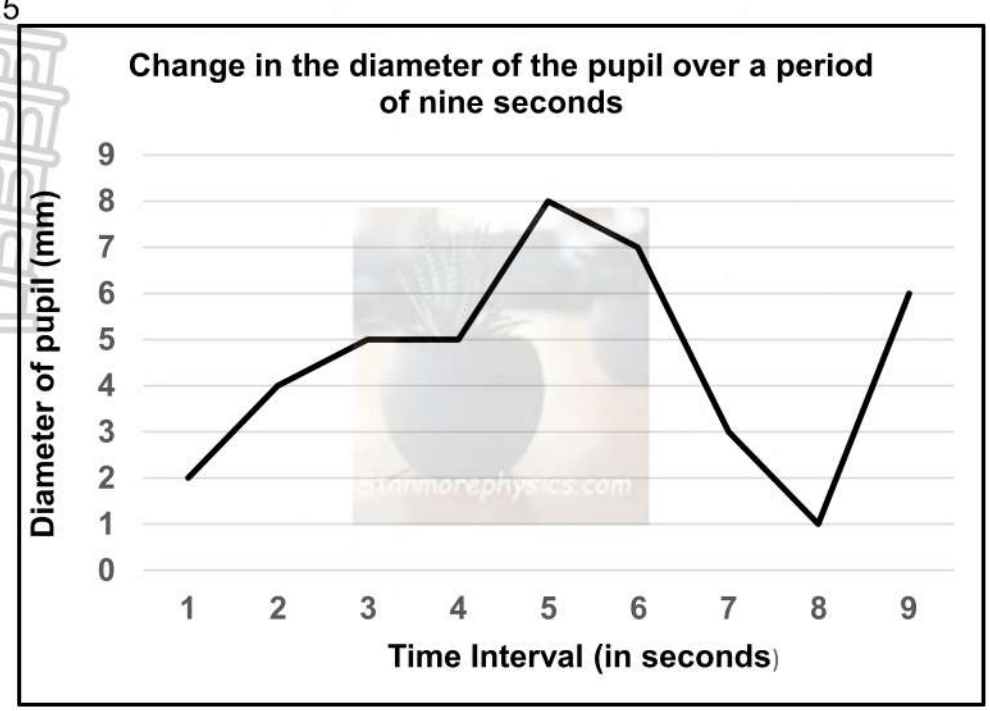
3.4.5




Criteria for marking of the graph:

| Criteria | Elaboration | Mark |
|---|---|---|
| Correct type of graph (**T**) | Line graph drawn | 1 |
| Caption of graph (**C**) | Both variables included | 1 |
| Axes labels (**L**) | **X-** and **Y**-axis correctly labelled and correct units for both axis | 1 |
| Scale for X-axis and Y-axis **(S)** | Correct scale for both axis | 1 |
| Plotting (**P**)<br>**1 - 4** co-ordinates plotted correctly<br>**All 5** co-ordinates plotted correctly | | <br>1<br>2 |

(6)
**(15)**

3.5 3.5.1 Phototropism ✓ (1)

3.5.2 Auxins ✓ (1)

3.5.3
- (Shoot) **C** bends towards the light ✓/stimulus/shows positive phototropism
- as it is exposed to unilateral light ✓/light from one side/left side.
- The auxins in the tip move away from the light side ✓/to the darker side/shaded side/right side.
- The higher concentration of auxins on the dark side ✓/shaded side/right side
- stimulates growth. ✓ Any (4)

3.5.4
- (Since the apical bud was removed) no auxins are produced in the tips. ✓
- Growth of lateral buds/branches is not inhibited. ✓ (2)

**(8)**

**[50]**

**TOTAL SECTION B: 100**
**GRAND TOTAL: 150**

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