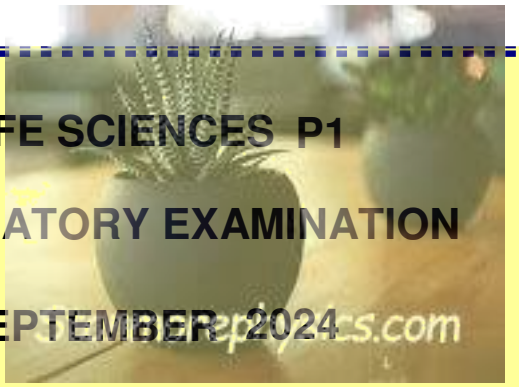
KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12



LIFE SCIENCES P1

PREPARATORY EXAMINATION

SEPTEMBER 2024

MARKS: 150

TIME: 2½ hours

N.B. This question paper consists of 15 pages including this page.

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. Make 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 correct answer and write only the letter (A to D) next to the question number (1.1.1 to 1.1.10) in your ANSWER BOOK, for example 1.1.11 D.

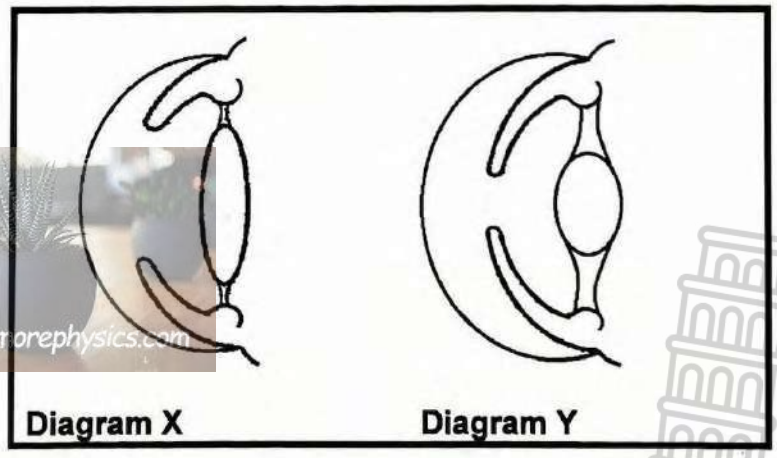
1.1.1 Which ONE of the following describes the nature of short-sightedness?

A The eyeball is longer than normal.
B Light rays fall behind the retina.
C Light rays are refracted more by the lens.
D Distant objects will appear blurred.

1.1.2 Which ONE of the following plant hormones will result in stunted/hindered growth in a plant when it's in deficit?

A Ethylene
B Abscisic acid
C Gibberellins
D Auxins

1.1.3 The diagrams bellows show part of an eye under different conditions.



Which ONE of the following is a correct comparison between the eye in Diagram **X** and the eye in diagram **Y**?

	Diagram X	Diagram Y
A	Looking at a near object	Looking at a distant object
B	Circular muscles contracted	Circular muscles relaxed
C	Suspensory ligaments are slack	Suspensory ligaments are taut
D	Lens has less refractive power	Lens has more refractive power

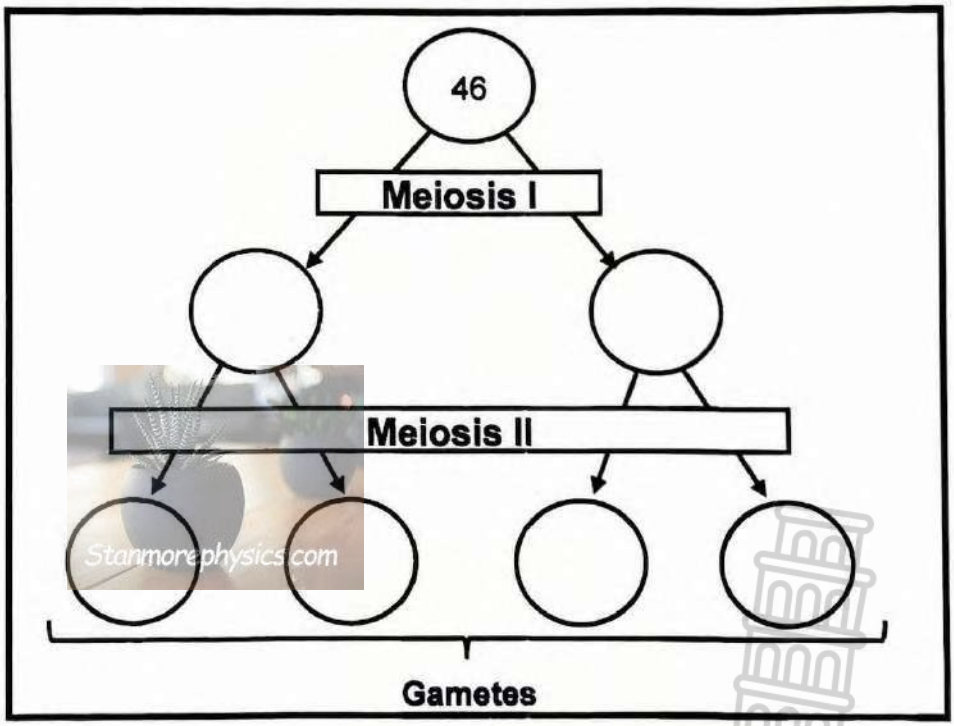
1.1.4 The ONE of the following is transported by the umbilical artery?

A carbon dioxide from the foetus to the mother.
B nutrients from the foetus to the mother.
C carbon dioxide from the mother to the foetus.
D nutrients from the mother to the foetus.

1.1.5 External fertilisation is the fusion of haploid nuclei of …

A male and female gametes in the body of the female.
B male and female gametes outside the body of the female.
C haploid male gamete with a diploid female gamete inside the body of the female.
D haploid male gamete with a female somatic/body cell inside the body of the female.

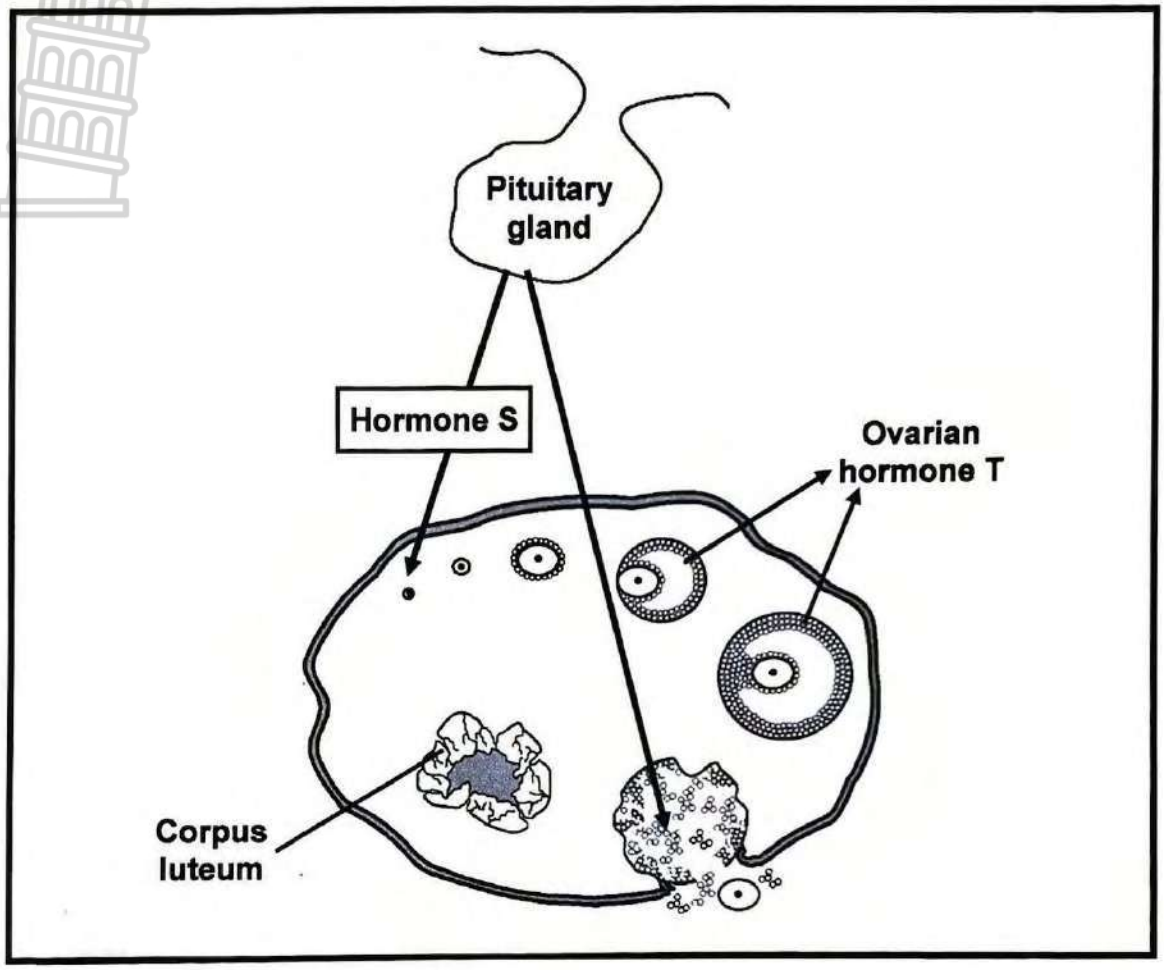
1.1.6 The following diagram represents a formation of normal gametes in humans.



The process represented in the diagram is …

A Spermatogenesis because meiosis II doubles the chromosome number
B Spermatogenesis and each gamete will be diploid
C Spermatogenesis since all four daughter cells become gametes
D Oogenesis since only two daughter cells will be diploid

QUESTION 1.1.7 AND 1.1.8 ARE BASED ON THE DIAGRAM BELOW RELATING TO A HUMAN FEMALE MENSTRUAL CYCLE.



1.1.7 Which ONE of the following is correct regarding **Ovarian hormone T**?

A Produced after ovulation
B It stimulates ovulation
C Stimulates follicle development
D Thickens the endometrium

1.1.8 **Hormone S** is ...

A Progesterone which stimulates milk formation.
B LH which thickens the endometrium.
C Oestrogen which maintains pregnancy.
D FSH which stimulates the development of a follicle.

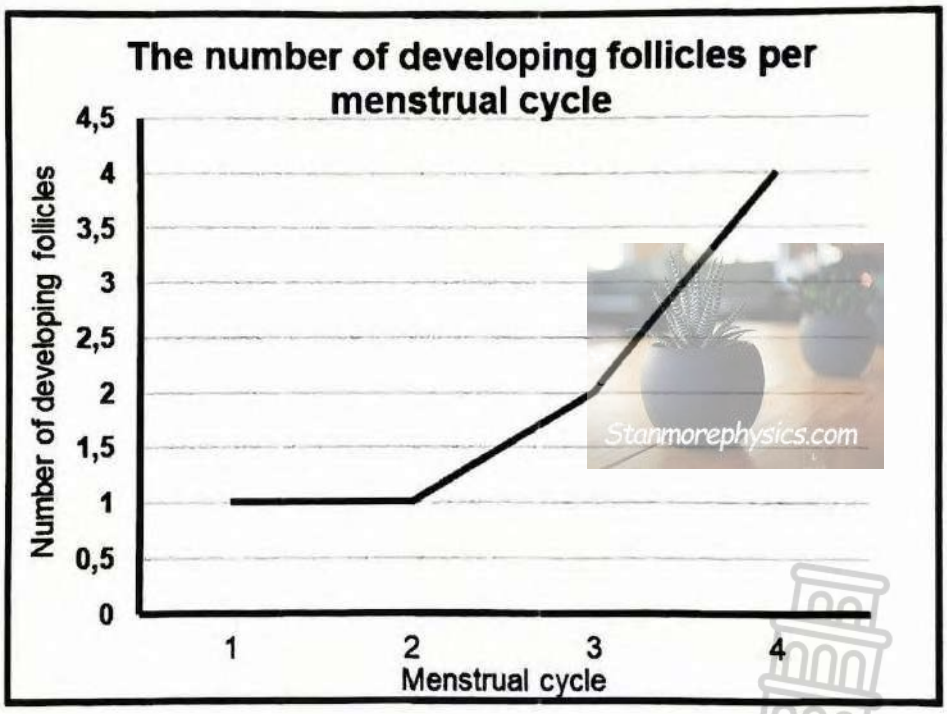
1.1.9 Below is a list of functions of a brain.

(i) Controls voluntary actions
(ii) Interprets impulses from sense organs
(iii) Controls heart beat
(iv) Stores memory
(v) Controls temperature

Which ONE of the following combinations applies to the cerebrum?

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

1.1.10 The graph below shows the effect of Clomiphene citrate (a birth control supplement) on a normal human female fertility.



Which ONE of the following is a correct interpretation of the effect of Clomiphene citrate on a human female's fertility? Clomiphene citrate ...

A increases fertility by decreasing the number of follicles that start developing per cycle.
B decreases fertility by increasing the number of follicles that start developing per cycle.
C increases fertility by increasing the secretion of FSH and LH.
D Increase fertility by inhibiting the secretion of FSH.

(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 1.2.8) in the ANSWER BOOK.

1.2.1 The growth of plants in response to light

1.2.2 The structure that serves as a micro-filter during pregnancy

1.2.3 The duct that transports semen and urine to the outside of the body

1.2.4 A reproductive strategy where the young receives nutrients through the placenta

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

1.2.6 A chemical containing plant hormones used to kill unwanted plants

1.2.7 Receptors that provide information about the position of the head

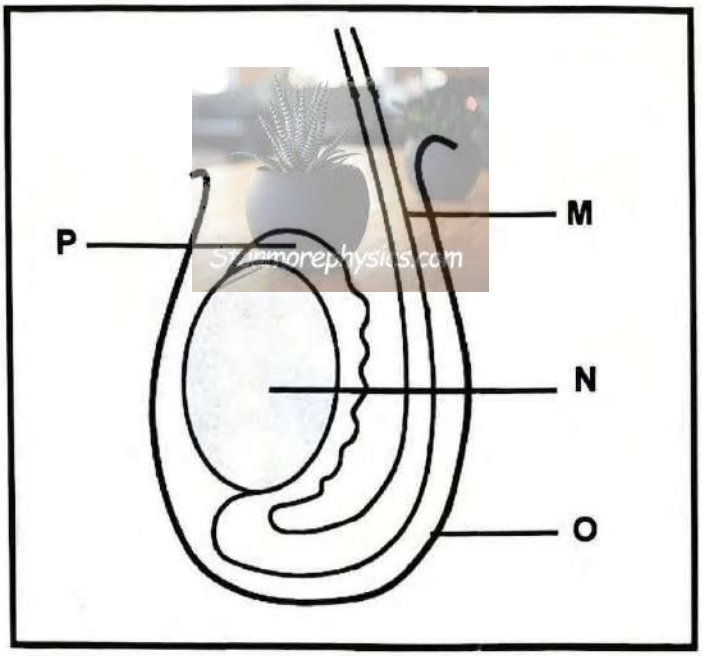
1.2.8 Part of a sperm cell that contains an enzyme to break down the cell membrane of an ovum (8 x 1) **(8)**

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 number (1.3.1 to 1.3.3) in the ANSWER BOOK.

COLUMN I		COLUMN II
1.3.1	Results in the elongation of internodes.	A: Auxins B: Gibberellins
1.3.2	The development in vertebrates where the young cannot move soon after being born	A: Altricial development B: Precocial development
1.3.3	A symptom of multiple sclerosis	A: Memory loss B: Difficulty walking

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

1.4 The diagram below shows ONE human testis after a surgery.



1.4.1 Write down the LETTER and the NAME of the part that:

(a) Stores sperms temporarily (2)

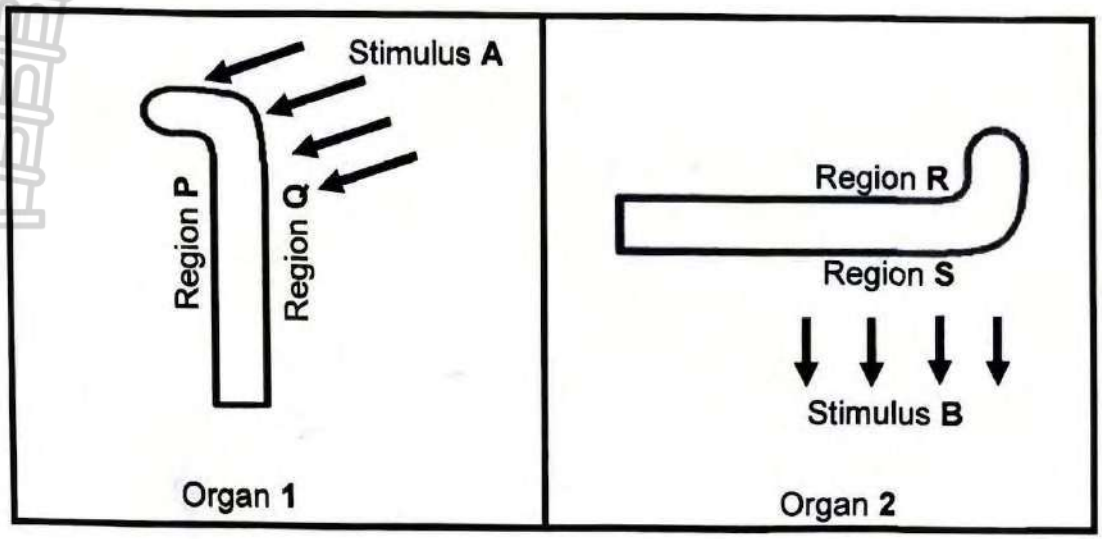
(b) Transports sperms to the ejaculatory duct (2)

(c) Protects and holds part **N** "outside" the body (2)

1.4.2 State TWO functions of part **N**. (2)

(8)

1.5 The diagrams below represent the growth responses of a stem and a root (in no particular order) to external stimuli.



1.5.1 Identify stimulus:

(a) **A** (1)

(b) **B** (1)

1.5.2 Identify organs (stem or root):

(a) **1** (1)

(b) **2** (1)

1.5.3 Write down the area (**P** or **Q**) where there will be high auxin concentration in organ **1**. (1)

1.5.4 Write down the area (**R** or **S**) where there will be more cell elongation in organ **2**. (1)

1.5.5 Identify the plant growth response shown by:

(a) Organ **1** (1)

(b) Organ **2** (1)

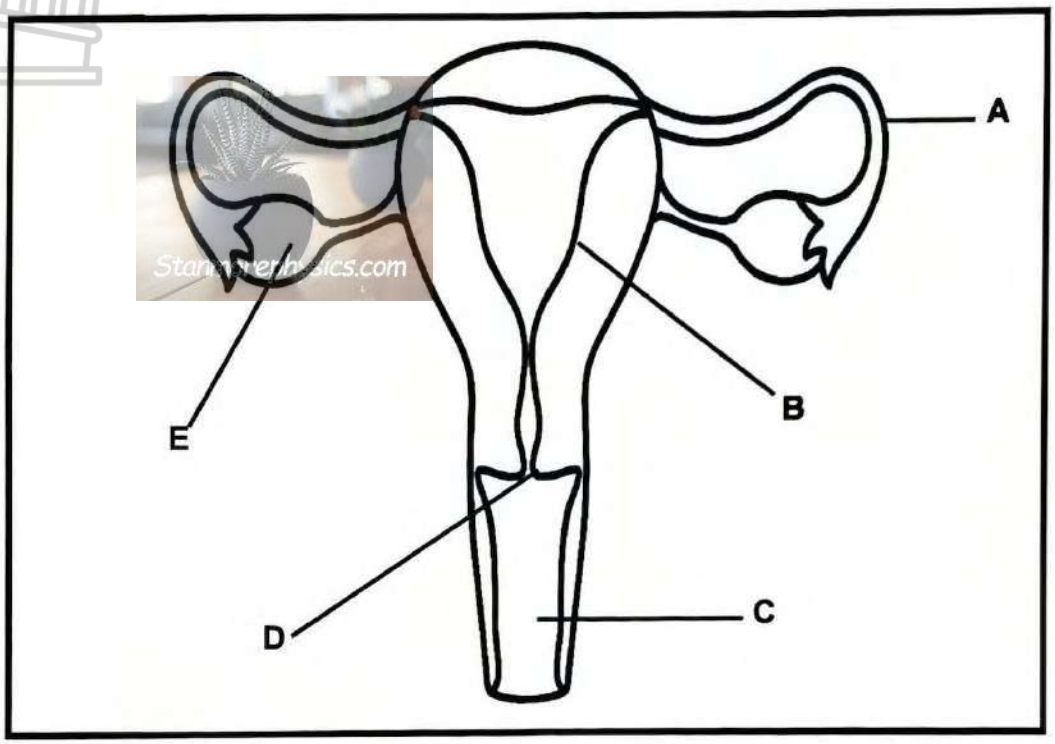
(8)

SECTION A: 50

SECTION B

QUESTION 2

2.1 The diagram below shows a female reproductive system.



2.1.1 Identify parts:

(a) **B** (1)

(b) **D** (1)

(c) **E** (1)

2.1.2 Give ONE function of part:

(a) **A** (1)

(b) **C** (1)

2.1.3 Explain the consequence for reproduction if part **A** was blocked on both sides. (3)

2.1.4 Describe how the developing embryo is protected during gestation. (5)

(13)

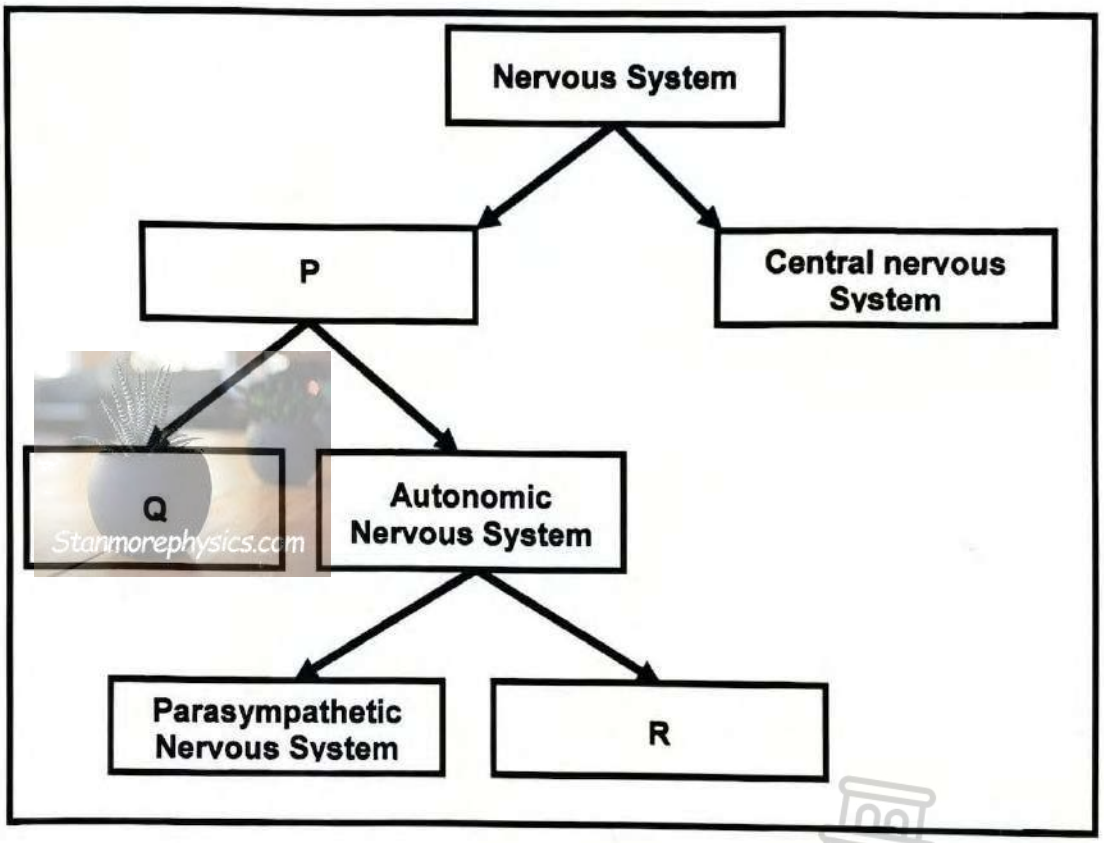
2.2 Human males and females are adapted differently for reproduction.

2.2.1 Name the hormone that stimulates secondary sexual characteristics in males. (1)

2.2.2 Describe how the location of testis is an adaptation for a successful production of gametes. (4)

(5)

2.3 The flow diagram below is based on the human nervous system.



2.3.1 Identify branch **P** of the nervous system which is made up of all the nerves outside the central nervous system. (1)

2.3.2 Name TWO parts that make up the central nervous system. (2)

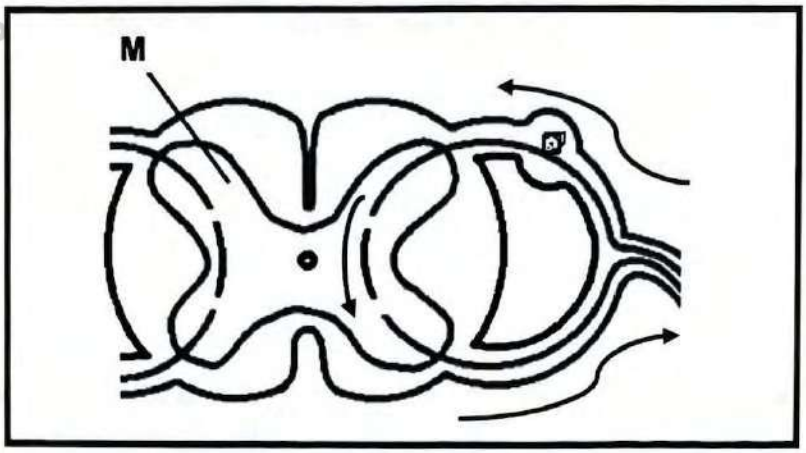
2.3.3 State ONE function of branch **Q** of the nervous system. (1)

2.3.4 Name the TWO groups of nerves that make up branch **P** of the nervous system. (2)

2.3.5 Describe the role of branch **R** of the nervous system when a person is chased by a dog. (5)

(11)

2.4 The diagram below shows part of a spinal cord.



2.4.1 Identify region **M** on the diagram. (1)

2.4.2 Describe the pathway of impulses in a reflex-arc as shown by the arrows on the diagram. (5)
(6)

2.5 Myasthenia gravis (MG) is a chronic autoimmune disorder in which antibodies destroy the communication between nerves and skeletal muscles.

The table below shows the incident of myasthenia gravis in a country.

Age group (years)	Prevalence of myasthenia gravis (per 100 000 people)	
	Males	Females
≤19	140	182
20 – 39	444	752
40 – 59	824	1293
60 – 79	453	732
≥80	24	63

2.5.1 Which age group is less likely to have myasthenia gravis? (1)

2.5.2 State TWO possible symptoms of this disease. (2)

2.5.3 Describe the trend of the prevalence of myasthenia gravis shown in females. (3)

2.5.4 This country has a population of 12 500 000 females during the time this survey was conducted.

Calculate how many females were likely to have myasthenia gravis between 40 and 59 years of age. Show all working. (3)

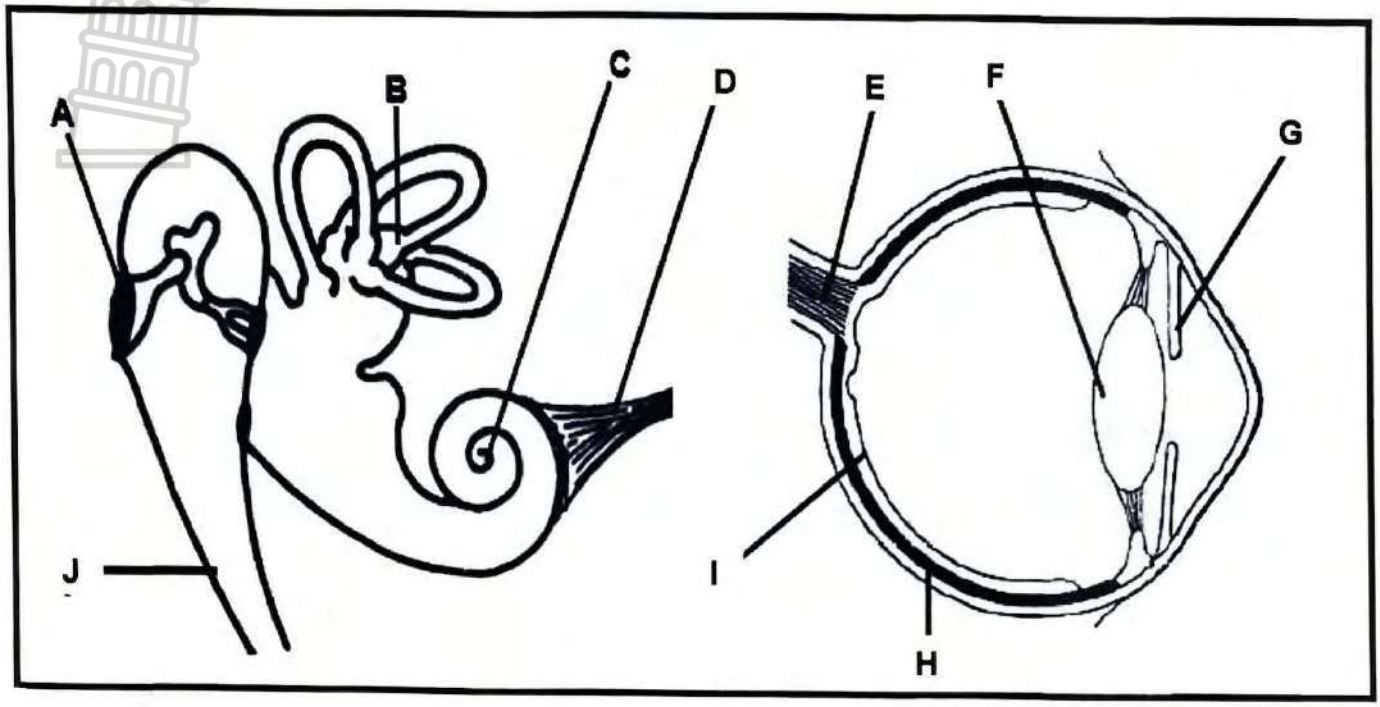
2.5.5 Draw a histogram to show the prevalence of myasthenia gravis in males between the age groups of ≤19 to 60 -79 years old. (6)

(15)

[50]

QUESTION 3

3.1 The diagram below show part of a human ear and a human eye.



3.1.1 Write down TWO LETTERS only of the parts that:

(a) Carry impulses (2)

(b) Contain receptors (2)

3.1.2 State ONE function of parts:

(a) **G** (1)

(b) **H** (1)

(c) **J** (1)

3.1.3 Miss Candice Ndlovu walked into a hall with a wet floor without knowing. She heard a loud voice from the helping lady "it's wet ..." and she slipped and almost fell.

Describe the role of part(s):

(a) **B** in maintaining balance in Miss Candice Ndlovu (3)

(b) **A** to **C** in enabling her to hear (5)

(15)

3.2 The passage below refers to thermoregulation.

Hyperthermia

Hyperthermia is a group of heat-related illnesses that occur if your body temperature rises uncontrollably, typically due to hot and humid weather. Signs that your body temperature is too high include a rapid heart rate, confusion, dry skin and hot skin. Prevent hyperthermia by drinking plenty of fluids and staying in air-conditioned spaces when it's hot outside

You can usually treat hyperthermia at home with cool compresses and fluids. You must seek medical attention immediately if you develop heat stroke, or a body temperature of 106 degrees or higher.

3.2.1 Name the control centre for temperature in the brain. (1)

3.2.2 Give TWO symptoms of hyperthermia mentioned in the passage. (2)

3.2.3 Describe the changes that occur in the skin when a person sits in a cold environment. (4)

3.2.4 Explain the possible effect of a prolonged hyperthermia on the body's metabolism. (3)

(10)

3.3 The conditions within cells depend on the conditions within the internal environment (the tissue fluid).

3.3.1 Tabulate TWO expected differences in the blood glucose levels between diabetic and non-diabetic people after eating a meal. (5)

3.3.2 Describe how the body maintains carbon dioxide within normal levels during an exercise. (5)

(10)

3.4 Hypopituitarism happens when the pituitary gland is not active enough. As a result, the gland does not make enough hormones including antidiuretic hormone (ADH). This leads to increased urine output as a symptom. A hormone supplement *desmopressin (DDAVP, Nocdurna)* is used to replace the missing ADH and lowers the amount of urine the body makes.

Scientists conducted an investigation following the steps below:

- 50 adults (men and women) of different age groups participated.
- They were divided into two groups (**A** and **B**)
- **Group A** was given a dose of desmopressin every evening at 18h00.
- **Group B** was not given any treatment.
- The amount of urine produced was measured before the start of the investigation.
- The amount of urine produced between 18h00 and 6h00 was measured every 2 hours daily for 5 days.

The table below shows the results of the investigation.

DAYS	AVERAGE URINE PRODUCED (ml/hour)	
	GROUP A	GROUP B
1	110	105
2	105	95
3	115	75
4	125	58
5	124	45

3.4.1 State the aim of this investigation. (2)

3.4.2 Give TWO ways in which the investigator increased the reliability of the results. (2)

3.4.3 State TWO planning steps for this investigation. (2)

3.4.4 Name the organ on which desmopressin functions. (1)

3.4.5 Give TWO reasons why the validity of this investigation was low. (2)

3.4.6 Explain results obtained in group **B**. (4)

3.4.7 State the conclusion for this investigation. (2)

(15)

[50]

TOTAL SECTION B: 100

GRAND TOTAL: 150

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 national 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. 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, graphs, tables, etc.) must have a caption.

KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

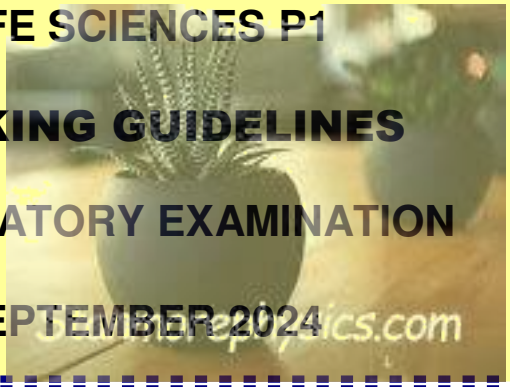
GRADE 12

LIFE SCIENCES P1

MARKING GUIDELINES

PREPARATORY EXAMINATION

SEPTEMBER 2024



MARKS: 150

This marking guideline consists of 9 pages.

SECTION A

QUESTION 1

1.1 1.1.1 A /D✓✓
1.1.2 C ✓✓
1.1.3 D ✓✓
1.1.4 A ✓✓
1.1.5 B ✓✓
1.1.6 C ✓✓
1.1.7 D ✓✓
1.1.8 D ✓✓
1.1.9 D ✓✓
1.1.10 No answer (9 x 2) **(18)**

1.2 1.2.1 Phototropism ✓
1.2.2 Placenta ✓
1.2.3 Urethra ✓
1.2.4 Vivipary ✓
1.2.5 Amniotic ✓ egg
1.2.6 Herbicides ✓
1.2.7 Maculae ✓
1.2.8 Acrosome ✓ **(8)**

1.3 1.3.1 B only ✓✓
1.3.2 A only ✓✓
1.3.3 B only ✓✓ (3 x 2) **(6)**

1.4 1.4.1 (a) P✓ - Epididymis✓ (2)

(b) M✓ - Vas deferens✓ (2)

(c) O✓ - Scrotum✓ (2)

1.4.2 - Produces sperm cells✓/ site of spermatogenesis
- Produces testosterone✓ (2)
(Mark first TWO only) **(8)**

1.5 1.5.1 (a) Light✓ (1)

(b) Gravity✓ (1)

1.5.2 (a) Root✓ (1)

(b) Stem✓ (1)

1.5.3 region P✓ (1)

1.5.4 region S✓ (1)

1.5.5 (a) Negative phototropism✓ (1)

(b) Negative geotropism✓ (1)
(8)

SECTION A: 48

SECTION B

QUESTION 2

2.1 2.1.1 (a) Endometrium ✓/uterus (1)

(b) Cervix ✓ (1)

(c) Ovary ✓ (1)

2.1.2 (a) It is a site of fertilisation ✓ / allows for the passage of an ovum/zygote. (1)
(Mark first ONE only)

(b) - Used for copulation ✓
- Serves as a passage for the baby during birth ✓ / It's a birth canal. Any (1)
(Mark first ONE only)

2.1.3 - Sperms and ova will not come into contact ✓
- Fertilisation will not happen ✓
- And a person will be infertile ✓ Any (3)

2.1.4 - It is kept within the uterus✓/inside the mother's body
- Covered by the chorion ✓ } **OR** extra embryonic membranes✓✓
- and an amnion ✓
- Surrounded by the amniotic fluid✓
- Which serves as shock absorber ✓/prevents mechanical injuries
- and prevents dehydration ✓
- Attached to the mother via placenta ✓
- which produces antibodies ✓
- and filters waste ✓
- Progesterone keeps the endometrium thick ✓
- Prevents miscarriage✓/allows for the attachment of the embryo. Any (5)

(13)

2.2 2.2.1 Testosterone ✓ (1)

2.2.2
- They hang outside the body ✓
- to expose them at a lower temperature ✓
- than the internal body temperature ✓
- that leads to the development of healthy sperms ✓
- and maintains the sperm count✓

Any (4)
(5)

2.3 2.3.1 Peripheral✓ nervous system (1)

2.3.2 Brain✓ and spinal cord✓
(Mark first TWO only) (2)

2.3.3 No answer

2.3.4 Cranial✓ and spinal✓ nerves
(Mark first TWO only) (2)

2.3.5
- To increase heart rate✓
- Dilates blood vessels of the skeletal muscles✓
- Dilates the pupil✓
- Constrict the blood vessels of the gut and skin✓
- To increase breathing rate✓
- Stimulates the adrenal gland✓
- To produce more adrenalin✓
- Stimulates the secretion of sweat✓

Any (5)
(10)

2.4 2.4.1 No answer

2.4.2
- receptors receive a stimulus ✓
- and convert it into an impulse ✓
- which travels via sensory neuron ✓
- to the spinal cord ✓
- the impulse travels through the synapse ✓
- into the interneuron ✓
- which sends it to the motor neuron ✓
- that carry impulse to the effector ✓
- to bring about a rapid response to the stimulus ✓

Any (5)
(5)

2.5 2.5.1 Above 80 ✓ years / ≥ 80 years (1)

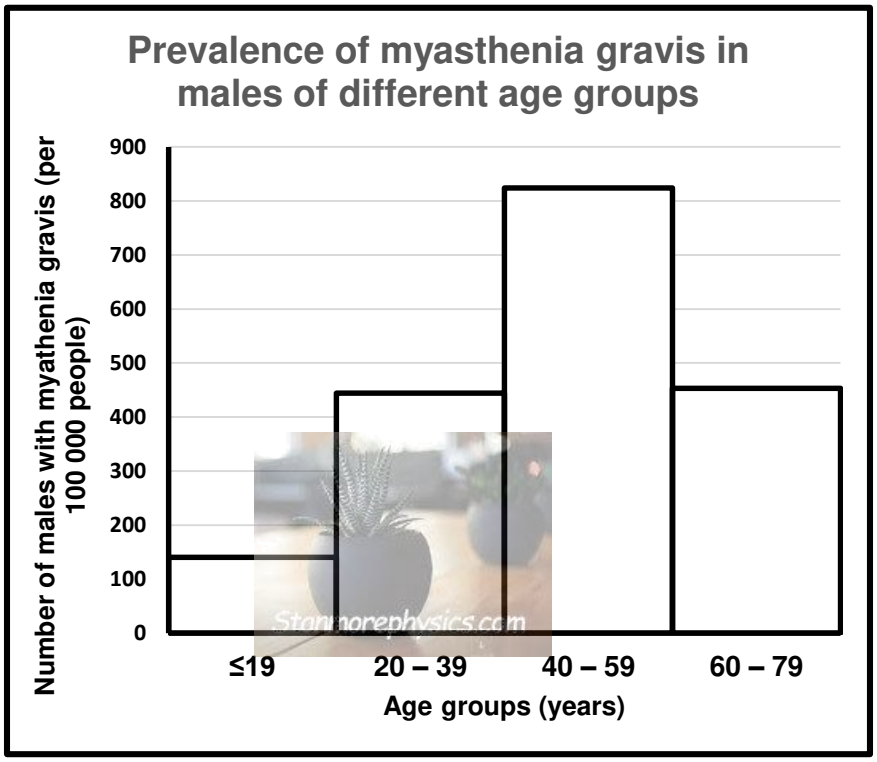
2.5.2
- Muscle weakness ✓
- Difficulty speaking ✓
- Difficulty moving✓ (hands/arms, legs/feet, any appropriate answer)
- Visual problems ✓

Any (2)
(Mark the FIRST TWO only)

2.5.3 The risk of myasthenia gravis increases as the age increase ✓ until the age of 59 ✓ after that it decreases as the age increases. ✓ (3)

2.5.4 (1293/100 000) ✓ × 12500000 ✓ = 161 625 ✓ (3)

2.5.5



MARKING CRITERIA

CRITERIA	ELABORATION	Marks
Caption of graph (**T**)	Both variables included	1
Correct type of graph (**C**)	Histogram drawn	1
Axes labels (**L**)	X- and Y – axes correctly labelled with units	1
Scale for X- and Y – axes (**S**)	Equal width of bars for x-axis Correct Y-axis	1
Plotting of bars (**P**)	- 1 – 3 correct bars drawn correctly - All 4 **required** bars drawn correctly	1 2

(6)
(15)
[48]

QUESTION 3

3.1 3.1.1 (a) D ✓ and E ✓ (2)

(b) B ✓, C ✓ and I ✓ Any (2)
(Mark first TWO only)

3.1.2 (a) Controls the amount of light that enters the eye ✓ (1)

(b) - Absorbs excess light✓
- Supplies the eye with nutrients and oxygen ✓ Any (1)

(c) Equalises air pressure between the middle and outer ear ✓ (1)

3.1.3 (a) - Contains cristae ✓
- Which are stimulated by the change in direction and speed ✓
- And convert the stimulus into an impulse ✓ (3)

(b) - Eardrum vibrates ✓
- Causing ossicles to vibrate and amplify vibrations ✓
- This causes vibration of the oval window ✓
- Setting pressure waves on the endolymph ✓
- Which stimulates the organ of Corti ✓ in the cochlea
- Organ of Corti converts the stimulus into an impulse ✓ Any (5)
[15]

3.2 3.2.1 Hypothalamus✓ (1)

3.2.2
- rapid heart rate✓
- confusion✓
- dry and hot skin✓ Any (2)
(Mark first TWO only)

3.2.3
- blood vessels of the skin constrict ✓ / vasoconstriction occurs
- less blood flows to the skin surface ✓
- less heat is lost✓ through radiation
- less blood flows to the sweat glands ✓
- sweat glands become less active ✓
- less sweat is produced ✓
- less heat is lost through evaporation ✓ / more heat is retained within the body. Any (4)

3.2.4
- High temperature ✓
- Enzymes will denature ✓ in the cells
- The rate of metabolism will decrease ✓ (3)
(10)

3.3 3.3.1 ✓

Diabetic person	Non-diabetic person
1. More increase in glucose level✓	1. Less increase in glucose level✓
2. Takes much longer to return to initial level✓	2. Returns to normal much faster✓

1 mark for table + any 4 (5)

3.3.2
- During exercise carbon dioxide increases ✓
- The receptors in the carotid arteries detect this increase ✓
- A message is sent to the medulla oblongata ✓
- Which send impulses to the breathing muscles ✓
- and the heart✓
- To increase the rate and depth of breathing ✓
- More deoxygenated blood is sent to the lungs ✓
- More carbon dioxide is exhaled ✓
- Carbon dioxide in the blood returns to normal ✓

Any (5)
(10)

3.4

3.4.1 No answer

3.4.2
- 50 adults participated ✓
- The investigation was done over a period of 5 days ✓

Any (2)
(Mark first TWO only)

3.4.3
- Ask for permission of the participants ✓
- Decide on the sample size ✓
- Decide on the time and venue ✓
- Decide on the duration of the investigation ✓
- Decide on a measuring tool✓
- Decide on a recording method✓

Any (2)
(Mark first TWO only)

3.4.4 Kidney✓ (1)

3.4.5 Participants were:
- Of different age groups✓
- Different gender✓
- Different health status✓/not specified whether they had hypopituitarism✓
- Measurements were not taken throughout the day✓
- Diet and liquid intake was not controlled✓

Any (2)
(Mark first TWO only)

3.4.6 No answer

3.4.7 No answer **(7)**
[42]

TOTAL SECTION B: 90
GRAND TOTAL: 138

CONVERSION TABLE

Mark obtained	Mark added
133 - 138	+12
121 – 132	+11
110 – 120	+10
97 – 109	+9
87 - 96	+8
74 – 86	+7
63 – 73	+6
52 – 62	+5
40 – 51	+4
30 – 39	+3
18 – 29	+2
6 – 17	+1
0 - 5	+0