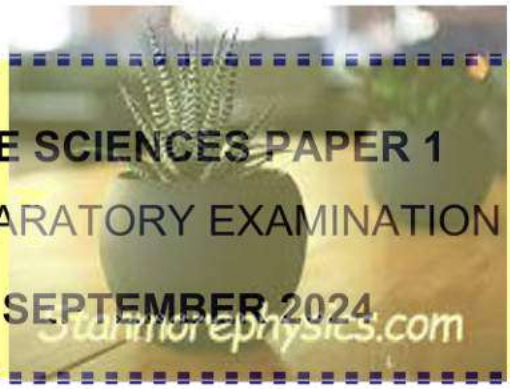
LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 12



LIFE SCIENCES PAPER 1

PREPARATORY EXAMINATION

SEPTEMBER 2024

MARKS: 150

DURATION: 2½ HOURS

This question paper consists of 13 pages

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK.
3. Start the answers to each question at the top of a NEW page.
4. Number the answers correctly 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 or black ink.
7. Draw diagrams, flow charts or tables 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 may use a non-programmable calculator, protractor and compass, where necessary.
11. Write neatly and legibly.

SECTION A

QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A to D) next to the question numbers (1.1.1 to 1.1.9) in the ANSWER BOOK, e.g. 1.1.10 D .

1.1.1 Which ONE of the following occurs when an apical bud from a rose bush is regularly removed? The rose bush will…

A. remain the same size.
B. grow taller.
C. produce more lateral branches.
D. produce more flowers.

1.1.2 A function of the cerebrum is to…

A. regulate appetite.
B. inhibit voluntary movements.
C. control higher thought processes.
D. control muscle tone and balance.

1.1.3 Which of the following parts of the brain co-ordinates voluntary movements?

A. Cerebellum
B. Spinal cord
C. Cell body
D. Meninges

1.1.4 The tough, non-elastic tissue that covers the outer part of the eyeball is the…

A. sclera.
B. conjunctiva.
C. choroid.
D. retina.

1.1.5 The amniotic fluid that surrounds the developing embryo of a human helps to…

A. transport oxygen to the developing embryo.
B. transport carbon dioxide to the developing embryo.
C. protect the embryo against mechanical injury.
D. transport nitrogenous waste substances to the developing embryo.

QUESTIONS 1.1.6 AND 1.1.7 REFER TO THE INVESTIGATION BELOW.

A scientist did an investigation to determine the effect of drinking water on urine production.

A healthy athlete was requested not to drink water or eat food for five hours before the investigation started. The investigation was conducted over a period of three days.

The following procedure was followed.

- Day 1, the athlete was given 500ml of water to drink.
- Day 2, the athlete was given 700ml of water to drink.
- Day 3, the athlete was given 900ml of water to drink.
- On each day of the investigation, the amount of urine produced by the athlete was measured and recorded over a four hour period after drinking the water.
- The average was calculated.

1.1.6 Which ONE of the following CORRECTLY indicates the dependent and independent variable?

	Independent variable	**Dependent variable**
A	The amount of urine produced	Time in hours
B	The amount of water consumed	The amount of urine produced
C	The amount of urine produced	The amount of water consumed
D	The person participating	Time in hours

1.1.7 The list below shows the planning steps before and after the investigation.

(i) Permission was obtained from the athlete.
(ii) The measuring tool was decided upon.
(iii) The amount of water was measured.
(iv) The duration of the investigation was decided upon.

Which of the planning steps above are correct?

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

1.1.8 Which ONE of the following is a function of gibberellins?

A. Slows down the germination of seeds.
B. Stimulate the germination of seeds.
C. Promotes the ageing of leaves.
D. Brings about tropism.

1.1.9 Which ONE of the following is a characteristic of external fertilisation?

A. The embryo is protected inside the body of the female.
B. Copulation takes place.
C. A large number of ova are produced.
D. Sperm is introduced into the body of the female.

(9 x2) **(18)**

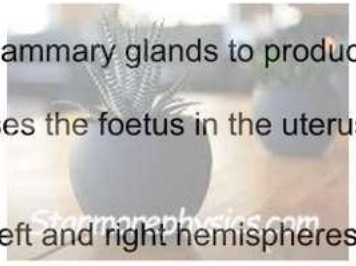
1.2 Give the correct biological term for each of the following descriptions. Write only the term next to the question numbers (1.2.1.to 1.2.10) in the ANSWER BOOK.

1.2.1 A process where an embryo attaches itself into the endometrium.

1.2.2 The division of the nervous system that is made up of the cranial and spinal nerves.

1.2.3 A hormone that stimulates the mammary glands to produce milk.

1.2.4 The outer membrane that encloses the foetus in the uterus of a human.



1.2.5 The structure that connects the left and right hemispheres of the cerebrum.

1.2.6 The blood vessel in the umbilical cord that transports nutrients to the foetus.

1.2.7 A disorder of the nervous system caused by the breakdown of the myelin sheath of neurons.

1.2.8 The open passage through which sound waves travel to the middle ear.

1.2.9 The external physical structures used by plants that prevents herbivores from feeding on them.

1.2.10 A behavioural pattern of animals feeding their young and protecting them from predators.

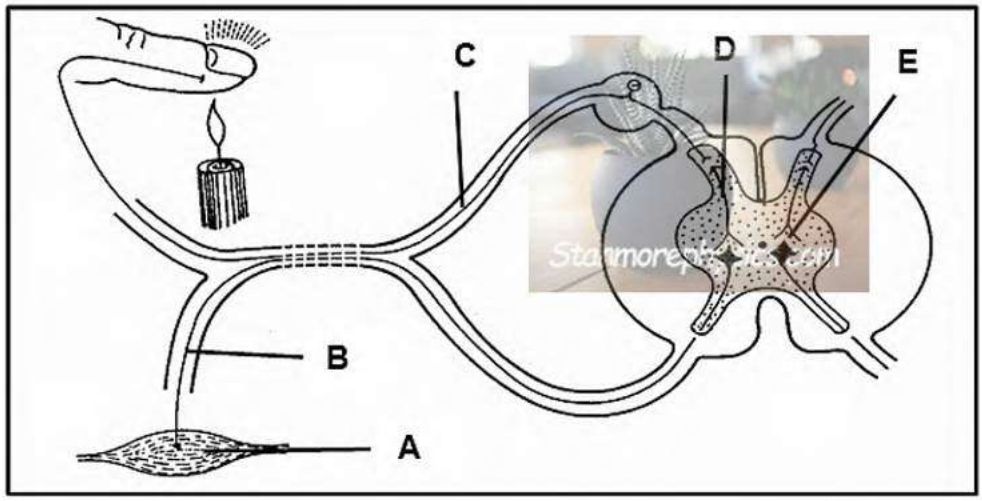
(10 x 1) **(10)**

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 number (1.3.1 to 1.3.3) in the ANSWER BOOK.

COLUMN I	COLUMN II
1.3.1. A hormone that stimulates the secretion of the hormone of the thyroid gland	A: Testosterone B: Abscisic acid
1.3.2. A part of the ear that absorbs sound waves from the inner ear	A: Round window B: Pinna
1.3.3. A gland that has ducts to transport its secretions to where they are needed	A: Endocrine gland B: Exocrine gland

(3x2) **(6)**

1.4 The diagram below represents a part of the human central nervous system.



1.4.1 Identify part:

(a) **A** (1)

(b) **D** (1)

(c) Microscopic gap at **E** (1)

1.4.2 Give the LETTER and NAME of the part which is probably damaged if a person…

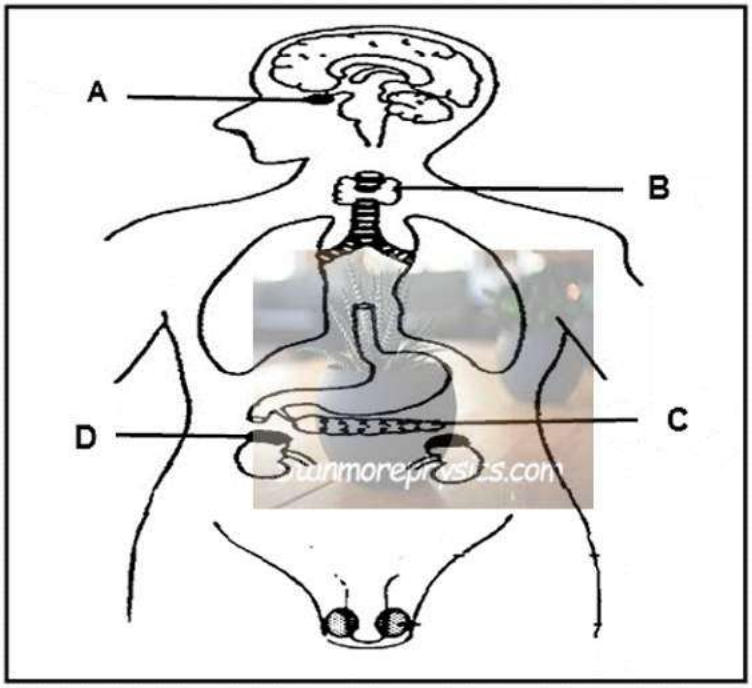
(a) can walk, but cannot detect any stimulus. (2)

(b) can feel the stimulus, but cannot respond. (2)

1.4.3 Write down in the **correct order** the LETTERS ONLY of the path taken by a nerve impulse until a response takes place. (2)

1.4.4 Give the name of the process which enables a person to quickly and involuntarily respond to a stimulus. (1)
(10)

1.5 The diagram below represents the human endocrine system.



1.5.1 Identify gland:

(a) **C** (1)

(b) **D** (1)

1.5.2 Give the name of the hormone that…

(a) Is involved in the reabsorption of salts in the renal tubules of the kidneys. (1)

(b) Controls the growth of long bones. (1)

1.5.3 Name the disease that results when gland **C** is unable to produce the hormone insulin. (1)

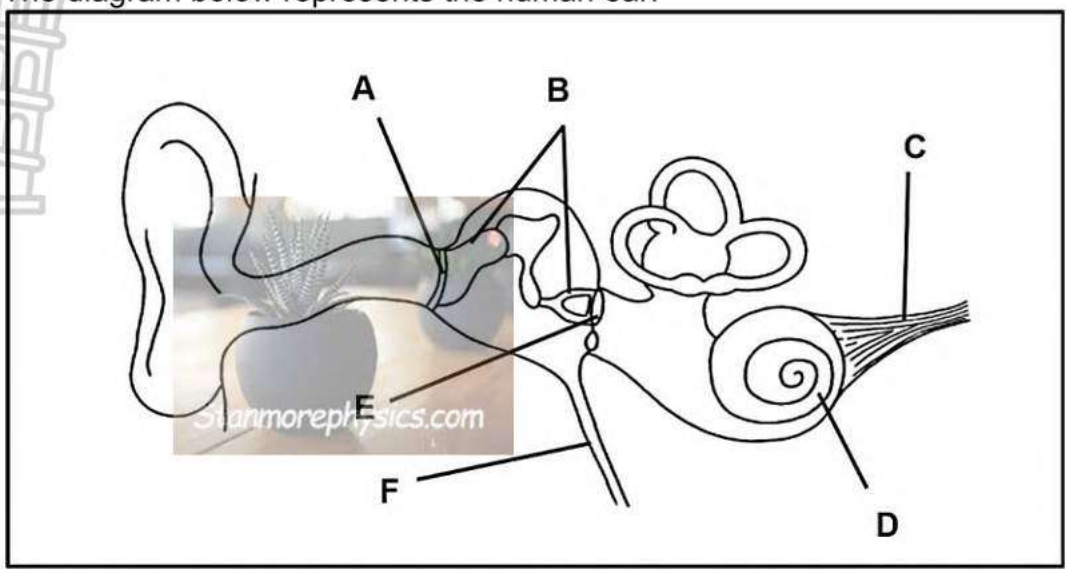
1.5.4 Name the type of interaction that occurs between the hormones secreted by glands **A** and **B.** (1)
(6)

TOTAL QUESTION 1: 50
TOTAL SECTION A: [50]

SECTION B

QUESTION 2

2.1 The diagram below represents the human ear.



2.1.1 Identify part:

(a) **C** (1)

(b) **D** (1)

(c) **E** (1)

2.1.2 State ONE function of part **F**. (1)

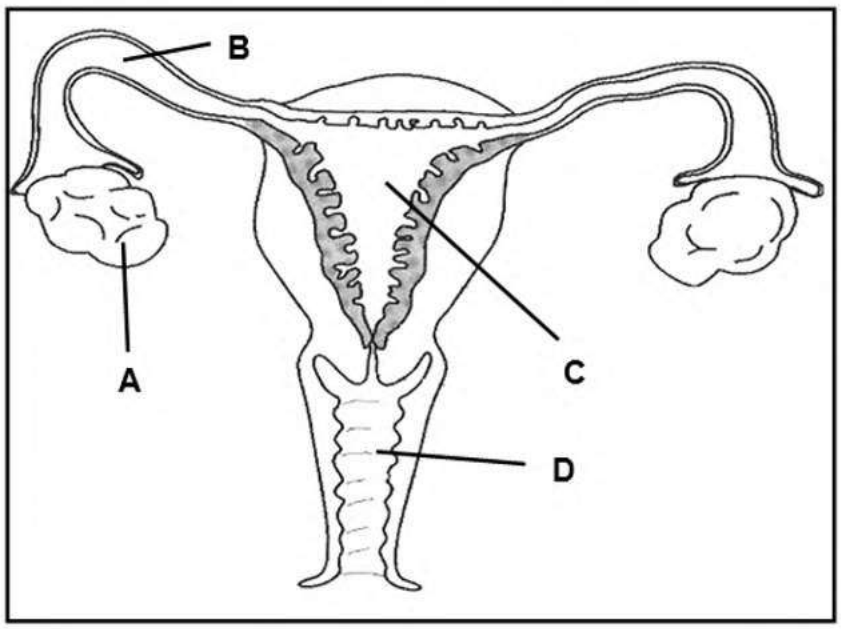
2.1.3 Middle ear infection is a common cause for loss of hearing.
Name ONE way in which middle ear infection can be treated. (1)

2.1.4 Describe how part **A, B** and **E** assists in amplifying sound. (4)

2.1.5 Describe how the semi-circular canals play a role in maintaining balance when the body changes speed and direction. (5)

(14)

2.2 The diagram below represents the female reproductive system.



2.2.1 Give the LETTER and NAME of the part where:

(a) Fertilisation takes place. (2)

(b) The embryo develops. (2)

2.2.2 State TWO functions of part **D**. (2)

2.2.3 Name and describe the type of gametogenesis that takes place in part **A.** (5)

(11)

2.3 Draw a labelled diagram to show the structure of a haploid cell that will fuse with a haploid cell produced in part **A**. **(5)**

2.4 The table below indicates the growth of a human foetus six months after fertilisation has taken place.

Months after fertilisation	1	2	3	4	5	6
Length of foetus (cm)	0,5	4	7,5	15	25	30

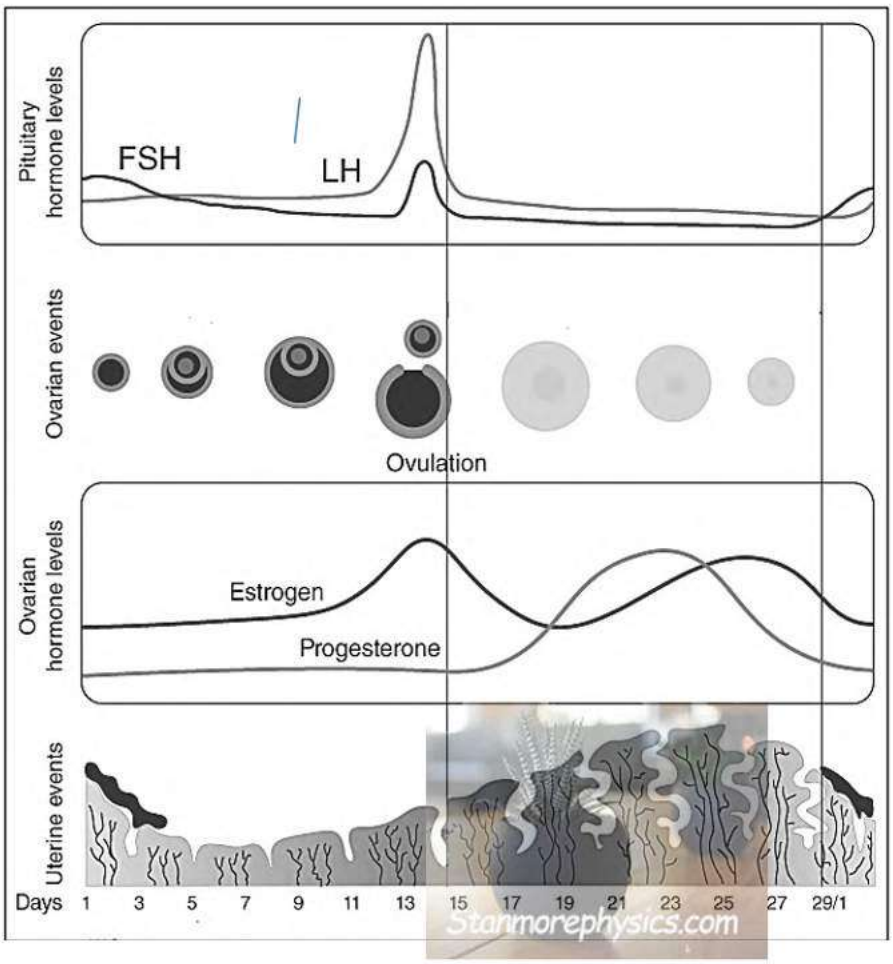
2.4.1 Between which two consecutive months did foetal growth double? (1)

2.4.2 What is the percentage increase in foetus length between the 3rd and 6th month after fertilization? Show ALL working. (3)

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

(10)

2.5 The graph below represents a menstrual cycle and the influence of the different hormones on it.



2.5.1 On which day does ovulation take place? (1)

2.5.2 Between which days does menstruation take place? (1)

2.5.3 State ONE function of LH other than ovulation. (1)

2.5.4 Describe the functional relationship between progesterone and FSH. (2)

2.5.5 Account for the change in the thickness of the endometrial lining between day 14 and day 21. (2)

2.5.6 Did fertilisation take place in the 28-day cycle illustrated in the graph? (1)

2.5.7 Explain your ANSWER to question 2.5.6. (2)
(10)

TOTAL QUESTION 2: 50

QUESTION 3

3.1 The table below shows a comparison of the composition of the amniotic egg in different bird species.

COMPOSITION	BIRD SPECIES		
	1	2	3
Yolk (%)	30	38	18
Water content in yolk (%)	79	59	57
Energy (kcal/g)	1,16	1,46	1,03

3.1.1 Define ovovivipary (2)

3.1.2 Which ONE of the bird species (1, 2 or 3) shows altricial development as a reproductive strategy? (1)

3.1.3 Explain your answer to QUESTION 3.1.2. (2)

(5)

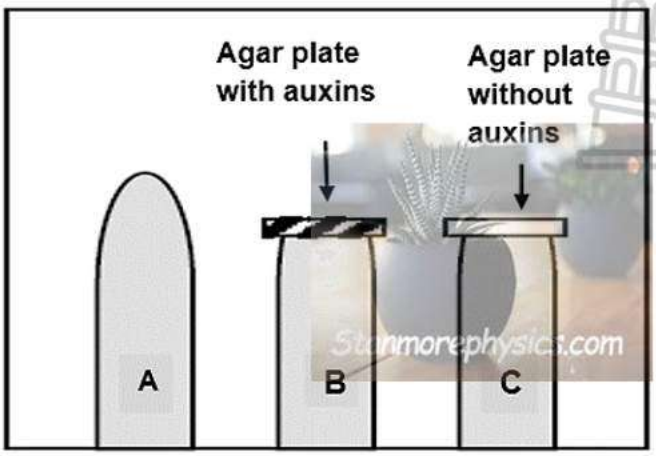
3.2 Dale did an investigation to determine the effect of auxins on the growth of three plant shoots (**A**, **B** and **C**). The plant shoots were treated as follows:

- Shoot **A** – Tip of the shoot was not removed
- Shoot **B** – Tip removed and an agar plate with auxins placed on top
- Shoot **C**– Tip removed and agar plate without auxins placed on top

(Agar is a jelly-like substance that allows auxins to diffuse through it)

All shoots were exposed to the same light conditions.

The diagram below indicates the set-up at the beginning of the investigation.



3.2.1 Explain the results as observed in:

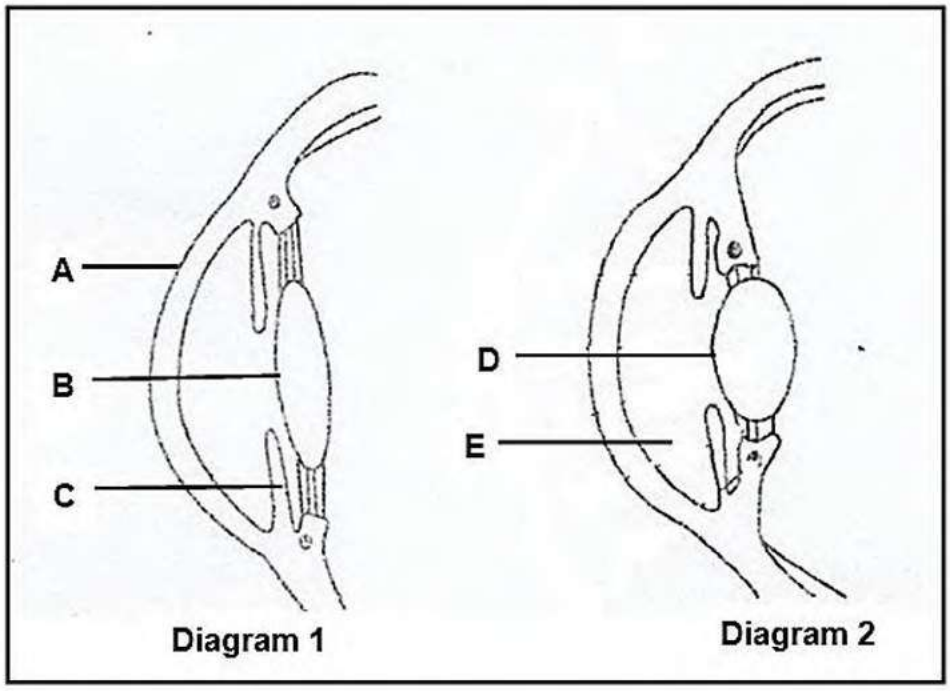
(a) Shoot **B** after a few days (2)

(b) Shoot **C** after a few days (2)

3.2.2 State TWO factors that must be kept constant in this investigation. (2)

3.2.3 State TWO ways in which Dale could have improved the reliability of her investigation. (2)
(8)

3.3 The diagrams below show parts of the human eye



3.3.1 Give the LETTER and NAME of the part that regulates the amount of light that enters the eye. (2)

3.3.2 Name and describe the process that the part named in QUESTION 3.3.1 will undergo when exposed to bright light. (5)

3.3.3 Explain how part **A** is structurally suited to perform its function. (2)

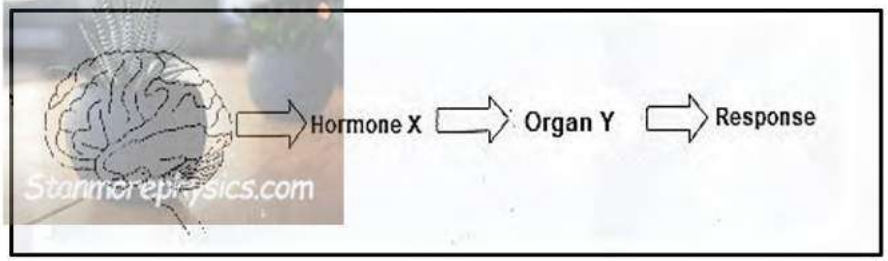
3.3.4 State TWO functions of the liquid in part **E**. (2)

3.3.5 Which diagram (**1** or **2**) is adapted to distant vision? (1)

3.3.6 Give a reason for your answer to question 3.3.5. (1)

3.3.7 Describe how the changes in the lens from **diagram 1** to **diagram 2** are brought about. (5)
(18)

3.4 The diagram below represents a homeostatic response that occurs when a person is dehydrated.
The decrease in blood volume, as a result of the excessive loss of water, is detected by the brain



3.4.1 Define the term homeostasis. (2)

3.4.2 Identify:

(a) Hormone **X**. (1)

(b) Target organ **Y**. (1)
(4)

3.5 Describe what happens when the Carbon dioxide level in the blood increases above normal. **(5)**

3.6 Read the passage below

Sphiwe was walking alone in the bush. She suddenly saw a big snake and she was very frightened. She screamed asking for help, turned around and ran away. During that time, she was breathing heavily and her eyes were wide open.

3.6.1 Name the hormone that prepared the body to evade the danger. (1)

3.6.2 State the role of the liver during an emergency. (1)

3.6.3 Explain the effects of the hormone mentioned in question 3.6.1 on the blood vessels of skeletal muscles. (4)
(6)

3.7 Explain how the thyroid gland is functionally related to body temperature on a cold day. **(4)**

TOTAL QUESTION 3: 50
TOTAL SECTION B: 100
GRAND TOTAL: 150

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GRADE 12

LIFE SCIENCES P1

SEPTEMBER

2024

MARKING GUIDELINES

MARKS: 150

This MARKING GUIDELINES consists of 10 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 part of it is required**
   Read all and credit relevant part.

4. **If comparisons are asked for and 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 becomes correct again, resume credit.

9. **Non-recognized 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 recognizable, accept, provided it does not mean something else in Life Sciences or if it is out of context.

13. **If common names given in terminology**
    Accept, provided it was accepted at the National memo discussion meeting.

14. **If only letter is asked for and only name is given (and vice versa)**
    No credit.

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

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

17. **Caption**
Credit will be given for captions to all illustrations (diagrams, graphs, tables, etc.) except where it is already given in the question.

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. 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

1.1.1	C✓✓		
1.1.2	C✓✓		
1.1.3	A✓✓		
1.1.4	A✓✓		
1.1.5	C✓✓		
1.1.6	B✓✓		
1.1.7	D✓✓		
1.1.8	B✓✓		
1.1.9	C✓✓	(9 x 2)	**(18)**

1.2

1.2.1	Implantation✓		
1.2.2	Peripheral✓nervous system		
1.2.3	Prolactin✓		
1.2.4	Chorion✓		
1.2.5	Corpus callosum✓.		
1.2.6	Umbilical vein✓		
1.2.7	Multiple sclerosis✓		
1.2.8	auditory canal✓		
1.2.9	Thorns✓		
1.2.10	Parental care✓	(10 x1)	**(10)**

1.3

1.3.1	None✓✓		
1.3.2	A only✓✓		
1.3.3	B only✓✓	(3 x 2)	**(6)**

1.4

1.4.1	(a) Effector✓/muscle		(1)
	(b) Interneuron✓/connector/relay		(1)
	(c) Synapse✓		(1)
1.4.2	(a) C✓ – Sensory neuron✓		(2)
	(b) B✓ - Motor neuron✓		(2)
1.4.3	C,D,B ✓✓ / *CDBA*	**(In the correct order)**	(2)
1.4.4	Reflex action✓		(1)
			(10)

1.5

1.5.1	(a) Pancreas✓		(1)
	(b) Adrenal ✓ gland		(1)
1.5.2	(a) Aldosterone✓		(1)
	(b) Growth hormone✓ / GH / *STH*		(1)
1.5.3	Diabetes ✓ mellitus		(1)
1.5.4	Negative feedback mechanism✓		(1)
			(6)
		TOTAL SECTION A:	**50**

SECTION B

QUESTION 2

2.1

2.1.1 (a) Auditory nerve✓ / *cochlear nerve* (1)
(b) Cochlea✓ (1)
(c) Oval window ✓ / *fenestra ovalis* (1)

2.1.2 Equalises pressure on both sides of the eardrum✓ *tympanum / tympanic membrane* **(Mark FIRST ONE only)** (1)

2.1.3 - use of grommets✓
- antibiotics ✓

(Mark FIRST ONE only) (1)

2.1.4 - the sound vibrations are transmitted from the large tympanic membrane✓ / A
- to the smaller oval window✓
- through the ossicles✓ / B
- which are arranged from largest to smallest✓
- this concentrates the vibrations✓thus amplifying them

Any (4)

2.1.5 - A change in speed/direction of movement
- stimulates the cristae✓
- the stimulus is converted into an impulse✓
- the impulse is transmitted to the cerebellum✓
- via the auditory nerve✓ / *vestibular nerve*
- the cerebellum sends impulses to the skeletal muscles ✓ to restore balance

(5)
(14)

2.2

2.2.1 (a) B✓ – Fallopian tube✓ / *oviduct* (2)
(b) C✓ – Uterus✓ (2)

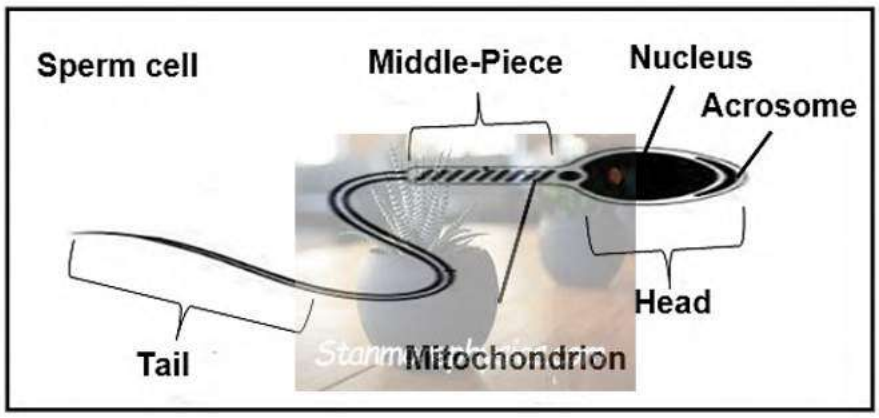
2.2.2 - it receives the penis during copulation✓
- place where semen is released during ejaculation✓
- it is a birth canal✓

(Mark FIRST TWO only) (2)

2.2.3 **- Oogenesis***✓
- Diploid cells✓ / *germinal epithelial cells*
- in the ovary undergo mitosis✓
- to form numerous follicles✓
- under the influence of FSH✓
- one cell inside the follicle enlarges and undergoes meiosis✓
- to form a haploid ovum✓

(1***Compulsory mark**+ Any4**)** (5)
(11)

2.3



Caption **(C)**	1 mark
Correct diagram **(D)**	1 mark
3 correct Labels **(L)**	3 marks

(5)

2.4

2.4.1 3 and 4✓

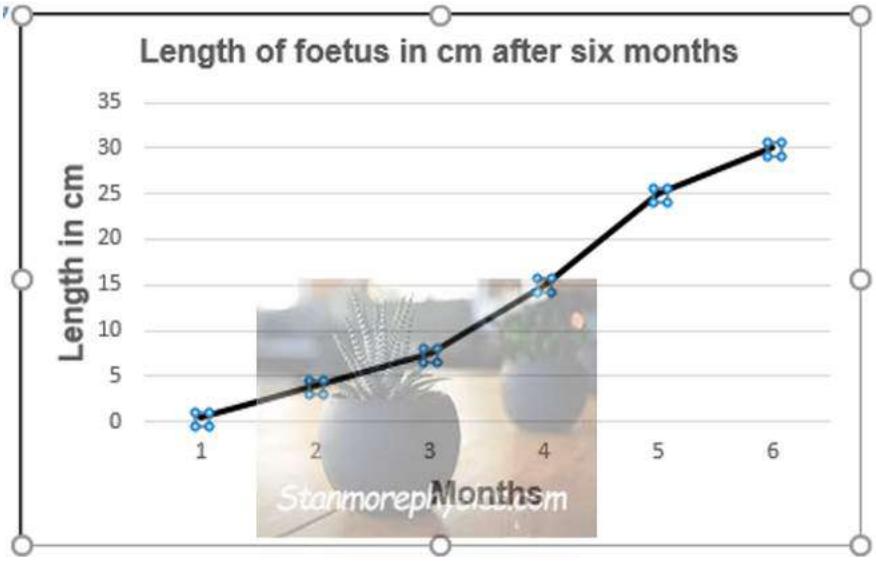
(Mark FIRST ONE only) (1)

2.4.2 $\frac{30 - 7,5}{7,5}$ ✓ $x\ 100$ ✓

$= 300\%$✓

(3)

2.4.3



(6)

Criteria for marking graph

Criteria	Mark allocation
Line graph is drawn **(T)**	1
Caption of graph include both variables**(C)**	1
Correct labels for X and Y axis**(L)**	1
Correct scale for X and Y axis **(S)**	1
Plotting **(P)** 1-4 Co-ordinates plotted All co-ordinates correct	 1 2

(10)

2.5

2.5.1 Day 14✓/15 (**accept** 15) (1)

2.5.2 Day *1 - 4*✓ (1)

2.5.3 - Stimulates the formation of the corpus luteum✓ (1)

2.5.4 - **an increase in the level of progesterone***✓
- inhibits the secretion of FSH✓
- no follicle will develop✓

OR

- **a decrease in the level progesterone***✓
- stimulates the secretion of FSH✓
- new follicle will develop✓

(1* **Compulsory mark** + Any1**)** (2)

2.5.5 - the corpus luteum starts to secrete progesterone✓ / *highest levels of progesterone*
- that continues to thicken the endometrium✓ (2)

2.5.6 No✓ (1)

2.5.7 - corpus luteum degenerated✓
- progesterone levels decreased✓
- FSH levels start to increase✓
- LH levels decrease✓
- *endometrium breaks down*✓ Any (2)

(10)

TOTAL QUESTION 2: 50

QUESTION 3

3.1

3.1.1 Eggs are retained/hatch inside the female body and the young are born live✓✓ (2)

3.1.2 3✓ **(Mark FIRST ONE only)** (1)

3.1.3 - the egg has the lowest/least yolk✓/energy content
- this will not allow maximum development before hatching✓ (2)

(5)

3.2

3.2.1 (a) – shoot will grow straight upwards✓
– auxins in the agar gel diffused evenly downwards✓
– causing equal growth on both sides of the shoot✓/cell elongation
– *no lateral branches will develop*✓ Any (2)

(b) – No upward growth✓
– since there is no auxins✓
– *lateral branches develop*✓ Any (2)

3.2.2 – same type of plant✓
– *same age of plant*✓
– *measure length at the same time*✓
– same environmental conditions✓ / (any example)
– tip removed at the same time✓
– tip removed at the same length✓
– same concentration/ *amount* of auxins✓
– same type of agar✓
Any (2)

3.2.3 – Repeat the investigation✓
– use more than one plant shoot✓/increase the sample size
(Mark FIRST TWO only) (2)

(8)

3.3

3.3.1 C✓ - Iris✓ (2)

3.3.2 ***Pupillary mechanism**✓
- circular muscles contract✓
- the radial muscles relax✓
- the pupil constricts✓
- less light enters the eye✓

(1* Compulsory mark + Any 4**)** (5)

3.3.3 Transparent✓- to permit light to pass through✓
OR
it is convex✓ - for the minor refraction of light rays✓ (2)

3.3.4 -maintains the shape of the cornea ✓
- supplies the lens and cornea with food and oxygen✓
- plays a minor role in their fraction of light✓

(Mark FIRST TWO only) (2)

3.3.5 1✓ (1)

3.3.6 The lens is less convex✓ (1)

3.3.7 - the ciliary muscles contract✓
- the ciliary body moves nearer to the lens✓
- suspensory ligaments slacken✓/tension decreases
- and tension on the lens is released✓
- the elastic lens becomes more convex✓ (5)

(18)

3.4

3.4.1 Maintenance of a constant internal environment within the body✓✓ (2)

3.4.2

(a) ADH✓ (1)
(b) Kidney✓ (1)

(4)

3.5 - receptor cells in the carotid artery✓ in the neck are stimulated
- to send nerve impulses to the medulla oblongata✓
- medulla oblongata stimulates breathing muscles✓ and heart✓
- breathing muscles contract more actively✓
- increasing the depth and rate of breathing✓
- the heart beats faster✓
- more carbon dioxide is exhaled✓
- the Carbon dioxide level returns back to normal✓

..... Any **(5)**

3.6

3.6.1 Adrenalin✓ (1)

3.6.2 It converts glycogen into glucose✓ (1)

3.6.3 – adrenalin causes the *blood vessels* to dilate✓since
– the muscles require more blood✓
– with more oxygen and glucose✓
– *for increased cellular respiration✓/ increase breakdown of glucose*
- to supply additional energy✓ Any (4)
(6)

3.7 -the thyroid gland becomes more active✓
- more thyroxin is secreted✓
- which increases metabolism✓/cellular respiration
- more heat is generated on a cold day✓ **(4)**

TOTAL QUESTION 3: 50
TOTAL SECTION B: 100
GRAND TOTAL: 150