



education

MPUMALANGA PROVINCE
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

LIFE SCIENCES P1

SEPTEMBER 2024

Stanmorephysics.com

MARKS: 150

TIME: 2½ HOURS



This question paper consists of 20 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 to the numbering system used in the question paper.
5. Present your answers according to the instructions of each question.
6. Do ALL drawings in pencil and label them in blue or black ink.
7. Draw diagrams, tables or flow charts only when asked to do so.
8. The diagrams in this question paper are NOT necessarily drawn to scale.
9. Do NOT use graph paper.
10. You must use a non-programmable calculator, protractor and a compass, where necessary.
11. Write neatly and legibly.



SECTION A

QUESTION 1

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

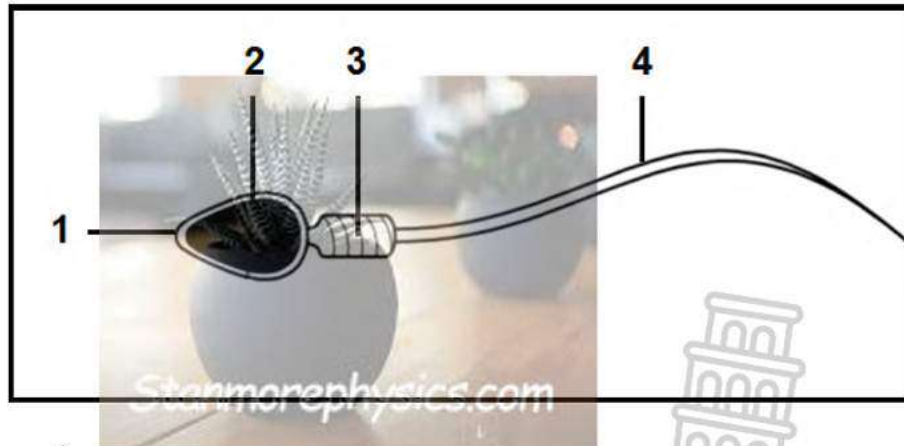
1.1.1 The structure in the amniotic egg that provides nutrients:

- A Allantois
- B Yolk sac
- C Amnion
- D Chorion

1.1.2 Which ONE of the following is the correct sequence of events during human reproduction?

- A Ovulation - oogenesis – implantation – fertilisation
- B Ovulation – oogenesis - fertilisation – implantation
- C Oogenesis - ovulation - fertilisation – implantation
- D Oogenesis - ovulation - implantation - fertilisation

1.1.3 Which ONE of the following parts in the diagram of a sperm cell contains a haploid number of chromosomes?

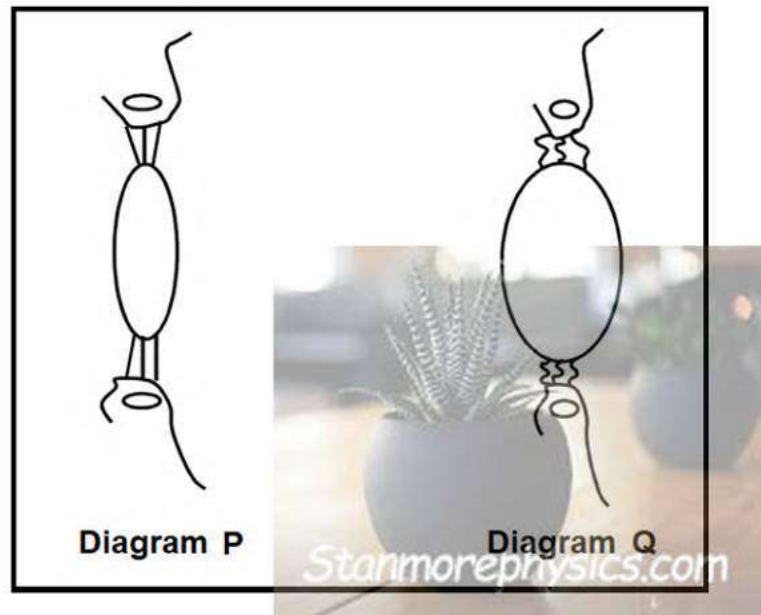


- A 1
- B 2
- C 3
- D 4



1.1.4

The diagrams below represent part of the human eye when looking at an object.



Which diagram, with a corresponding reason, represents a person looking at an object 10 metres away?

- A Diagram **Q** because the suspensory ligaments are taut and the lens is less convex
- B Diagram **Q** because the lens is more convex and the suspensory ligaments are slack
- C Diagram **P** because the lens is more convex and the suspensory ligaments are slack
- D Diagram **P** because the suspensory ligaments are taut and the lens is less convex

1.1.5 Which ONE of the following is a consequence if the round window in the middle ear hardens?

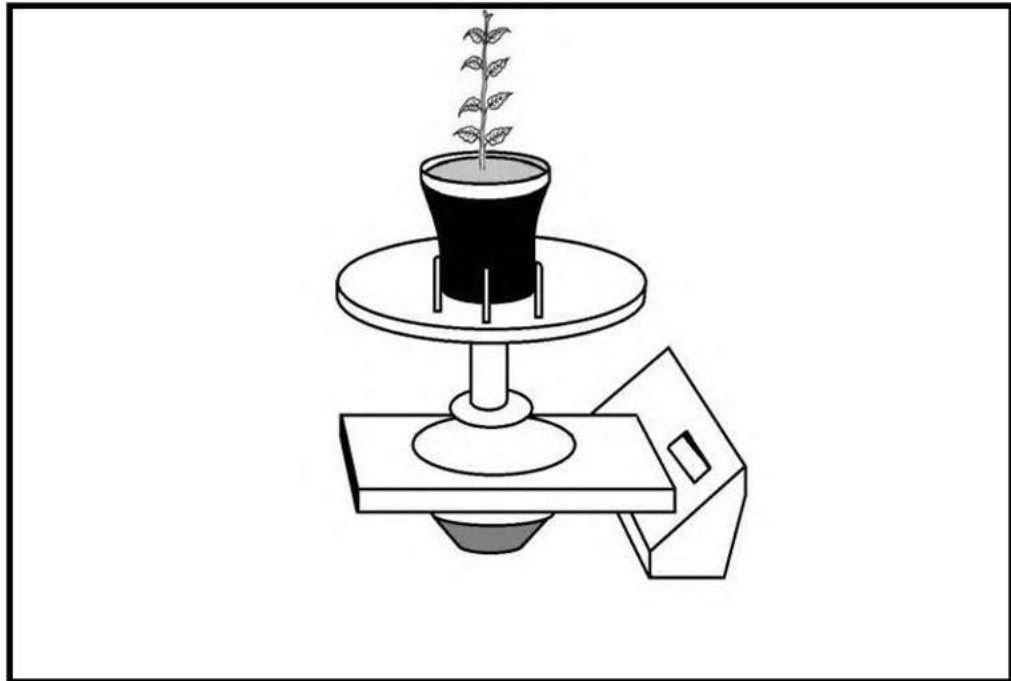
- A Impulses will not be transmitted to the brain.
- B Pressure between the outer and the middle ear will not be equalised.
- C An echo will occur and the sound will be distorted.
- D Pressure waves will not be created.

1.1.6 Which ONE of the following plant hormones is responsible for the germination of seeds?

- A Auxin
- B Growth hormone
- C Gibberellin
- D Abscisic acid



1.1.7 An investigation was conducted in which a potted plant was placed vertically on a clinostat, as shown in the diagram. The plant was exposed to light from all directions.



The stem grew vertically upwards, which indicates that the clinostat was ...

- A rotating and the stem showed positive phototropism.
- B stationary and the stem showed negative phototropism.
- C rotating and the stem showed positive geotropism.
- D stationary and the stem showed negative geotropism.

1.1.8 The level of aldosterone will most likely to increase after ...

- A sweating excessively.
- B consuming food with a high salt content.
- C the constriction of blood vessels to the skin.
- D consuming food with a high glucose content.





1.1.9 Which ONE of the following is **not** regulated by homeostatic mechanisms?

- A pH of tissue fluid
- B Concentration of respiratory gases in the blood
- C Surface area to body ratio
- D Temperature of the body

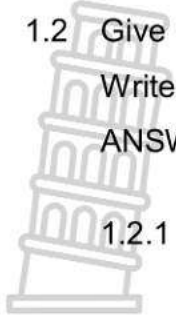
1.1.10 The part of the brain that receives nerve impulses from the semi-circular canals is the ...

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

(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 1.2.10) in the ANSWER BOOK.



- 1.2.1 The blood vessel that transports deoxygenated blood from the foetus towards the placenta
- 1.2.2 A structure in the female reproductive system where semen is deposited during copulation.
- 1.2.3 The liquid that protects the embryo against mechanical injury and dehydration.
- 1.2.4 The part of the nervous system outside the brain and spinal cord
- 1.2.5 A plant hormone that causes leaves to fall off trees in autumn.
- 1.2.6 The hormone that controls the concentration of water in the blood.
- 1.2.7 Neurons that carry impulses from receptors.
- 1.2.8 The structure, within the cochlea, responsible for the conversion of a sound stimulus into an impulse.
- 1.2.9 The maintenance of a constant internal environment in the body within certain limits.
- 1.2.10 Defect of the eye due to a clouding of the eye's normal, clear, transparent lens, affecting acuity of vision.

(10 x 1) (10)



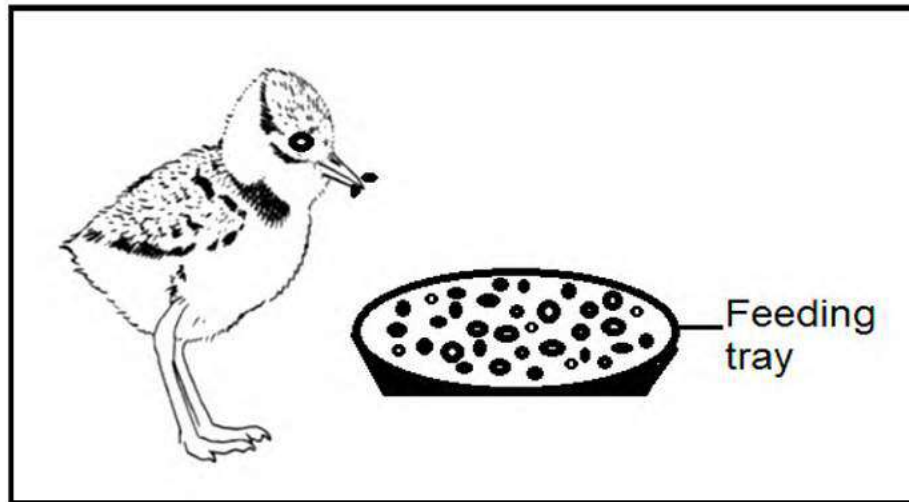
1.3 Indicate whether each of the statements in COLUMN I applies to **A ONLY, B ONLY, BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only, B only, both A and B** or **none** next to the question number (1.3.1 to 1.3.4) in the ANSWER BOOK.

COLUMN I		COLUMN II	
1.3.1	The tough, non-elastic tissue covering the outer portion of the eye ball	A:	conjunctiva
		B:	choroid
1.3.2	The disease characterised by the degeneration of brain tissue, leading to memory loss	A:	Alzheimer's disease
		B:	Multiple sclerosis
1.3.3	The period during which the embryo develops within the uterus of the mother up to the time the baby is born.	A:	Pregnancy
		B:	Gestation
1.3.4	Plant defence mechanism	A:	Chemicals
		B:	Thorns

(4 x 2) (8)



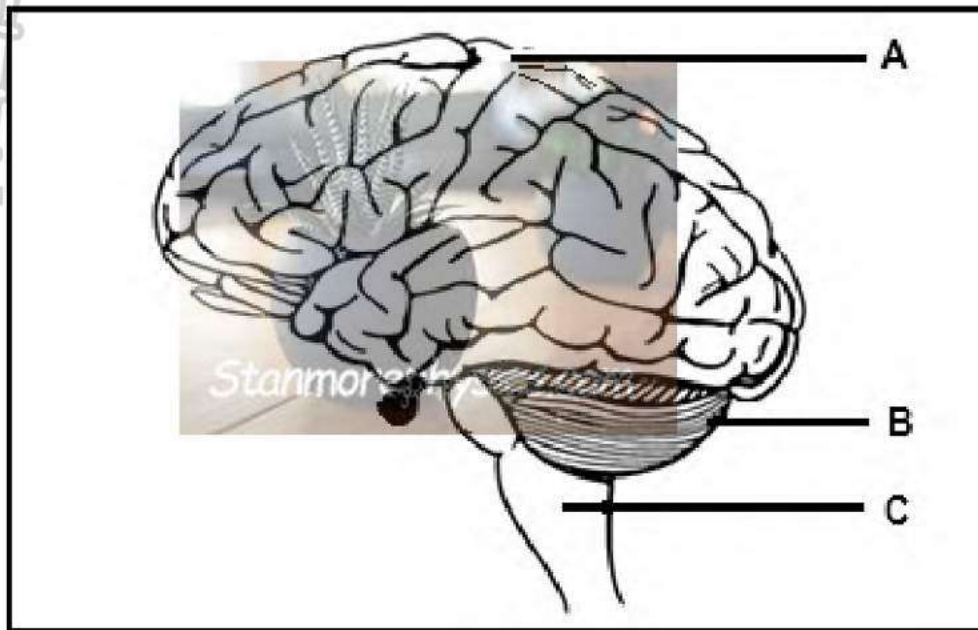
1.4 Study the diagram and answer the questions that follow.



- 1.4.1 Name the reproductive strategy that is carried out by the organism in the diagram above. (1)
 - 1.4.2 Name the type of development shown in the diagram above. (1)
 - 1.4.3 Give THREE visible reasons for your answer in QUESTION 1.4.2. (3)
 - 1.4.4 Name the type of fertilization that occurs in the organism on the diagram above. (1)
- (6)**



1.5 The diagram below represents parts of a human brain



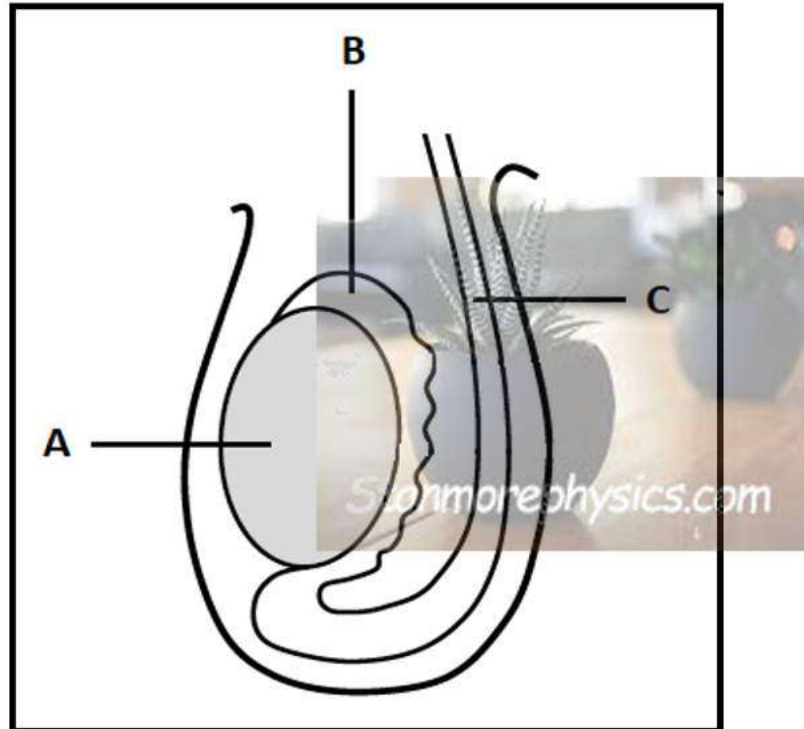
- 1.5.1 Give the LETTER and the NAME of the part that coordinates voluntary movement. (2)
- 1.5.2 State TWO functions of part B. (2)
- 1.5.3 Give two involuntary actions that are controlled by part C. (2)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 Study the diagram and answer the questions below.



2.1.1 Identify parts **A**, **B** and **C** respectively. (3)

2.1.2 Describe the process of spermatogenesis in part **A**. (4)

2.1.3 Test results show that a man has a low sperm count.

Explain why a doctor would advise the man to wear underwear that is not tight. (2)

2.1.4 During a vasectomy the vas deferens from both testes is cut.

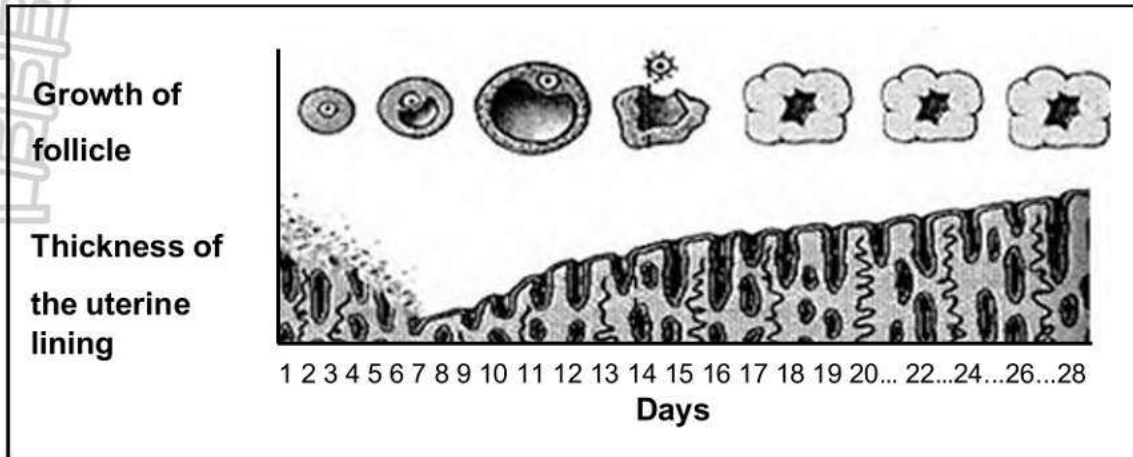
Explain ONE reason why a man who:

(a) Does not want to have children will choose to have a vasectomy (2)

(b) Has had a vasectomy is still capable of ejaculation (2)

(13)

2.2 The diagram below shows some of the changes that take place during the menstrual cycle.



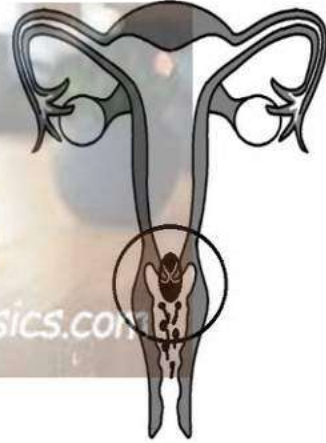
- 2.2.1 On which day did ovulation take place? (1)
- 2.2.2 Name TWO hormones which will increase in level between day 2 and day 10. (2)
- 2.2.3 Give TWO observable reasons for your answer to QUESTION 2.2.2. (2)
- 2.2.4 Provide evidence from the diagram which indicates that fertilisation took place. (2)
- 2.2.5 Describe the role of LH and Progesterone during the menstrual cycle. (6)
- (13)**



2.3 Read the extract below about infertility problems with cervical mucus and answer the questions below.

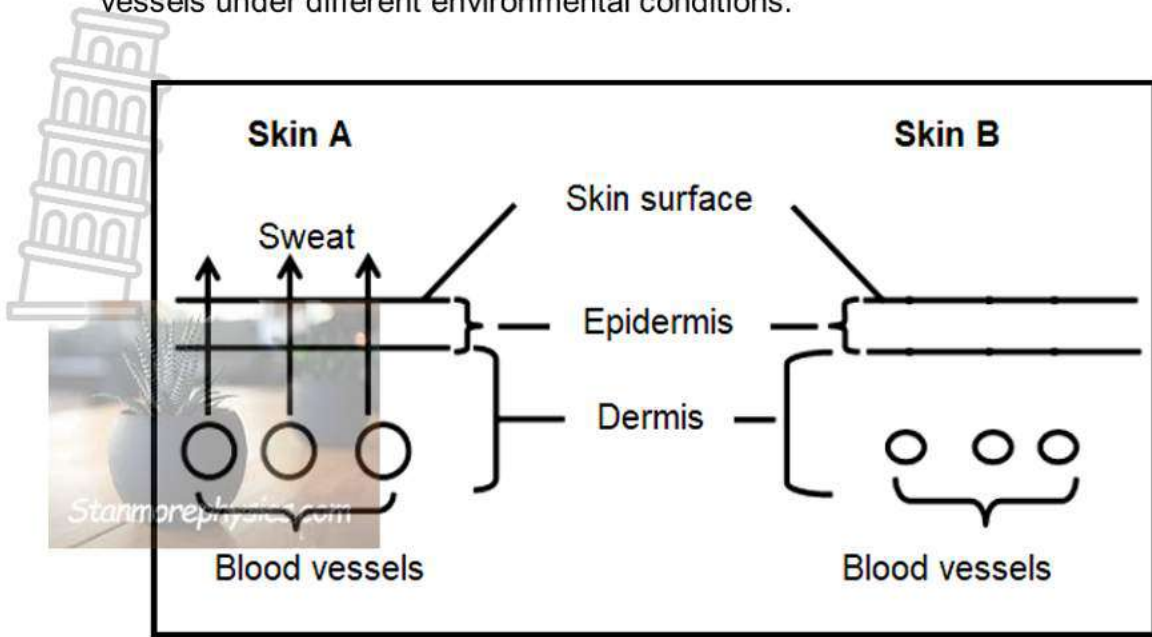
Abnormal cervical mucus can prevent sperm from entering the uterus, but this problem is rarely a major cause of infertility.

- Problems with cervical mucus are not usually a major cause of infertility, but they may be a factor in women who have a cervical infection or scar tissue in the cervix (cervical stenosis).
- Doctors do a pelvic examination to check for infection and a cervical canal that is narrowed or closed because of scar tissue
- If a cervical infection is diagnosed, it is treated with antibiotics. If cervical stenosis is detected, it may be treated with a procedure to dilate (widen) the cervix.



- 2.3.1 State ONE function of cervix. (1)
- 2.3.2 From the extract, state ONE way in which cervical infection is treated. (1)
- 2.3.3 Give a reason why cervical stenosis needs to be treated. (1)
- 2.3.4 Explain why cervical mucus may cause infertility if it is extreme. (3)
- (6)**

2.4 Study the diagram of skin **A** and **B** showing the section through the blood vessels under different environmental conditions.



<https://www.education.gov.za>

- 2.4.1 Which is the environmental condition that resulted in appearance of skin **B**? (1)
- 2.4.2 Describe the process that is taking place in skin **A** in order to maintain a constant body temperature. (3)
- 2.4.3 Explain why sweating plays an important role in maintaining body temperature, when the environmental temperature increases. (3)
- 2.4.4 A person with skin **B** started to exercise as a way of keeping warm for a period of 20 minutes. This person's skin temperature was measured over that time period. The table below shows temperature measurements obtained.

Time (Minutes)	Temperature of person with skin B (°C)
0	19 °C
5	27 °C
10	30 °C
15	35 °C
20	38 °C

Calculate the percentage increase of temperature from 10 to 20 minutes.

(3)
(10)

2.5 An investigation was conducted to determine the effect of different amounts of thyroxin on metabolic rate.

The procedure was as follows:

- Nine healthy adult male rats were used.
- They were divided into three groups of three rats each: **1, 2 and 3**.
- All three groups were kept in the same environment in three separate cages.
- Each group received the same amount of water.
- Each group was given a different diet.
- Their initial mass was taken.
- Three weeks later the mass was taken again.
- Their oxygen consumption was also measured.

DIET **A**: Food containing all the essential nutrients without thyroxin

DIET **B**: Food containing all the essential nutrients and an extract of thyroxin

DIET **C**: Food containing all the essential nutrients, and a chemical that inhibits the effect of thyroxin

GROUP	DIET	AVERAGE MASS OF RATS (g)		AVERAGE OXYGEN CONSUMPTION (ml/kg/min)
		INITIAL	AFTER THREE WEEKS	
1	A	319	321	4,0
2	?	320	309	10,0
3	?	318	340	2,7

NOTE: Group 1 was given DIET A.

2.5.1 Identify the:

- (a) Independent variable (1)
- (b) Dependent variable (1)

2.5.2 Name the group(s) (**1, 2 or 3**) in which the average mass of the rats increased. (2)

2.5.3 Which factors were kept constant in this investigation? (2)

2.5.4 Refer to changes in mass and oxygen consumption of the rats in the table above, provide a conclusion thereof. (2)

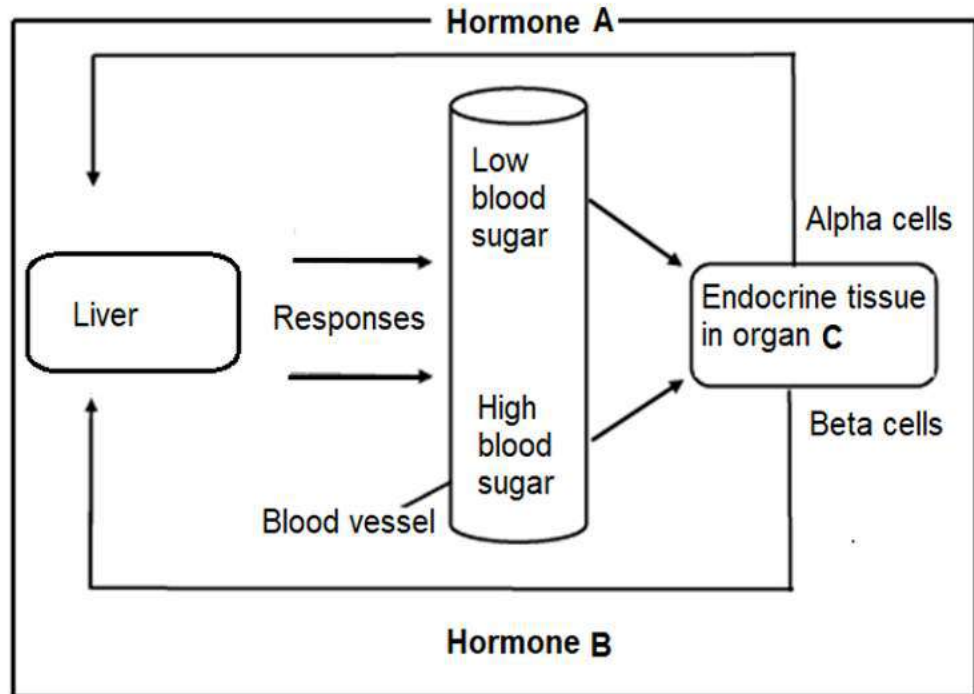
TOTAL QUESTION 2 [8] [50]

QUESTION 3



3.1

The diagram below represents the homeostasis of blood glucose in the human body.



3.1.1 Identify hormone **A** and **B** (2)

3.1.2 Name:

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

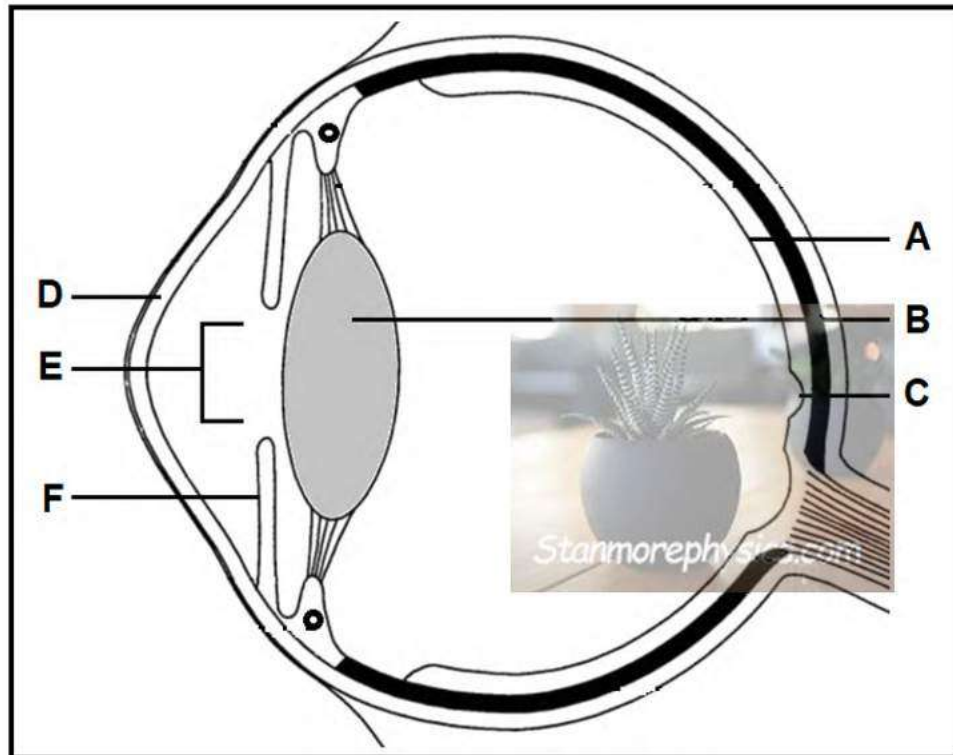
(b) The endocrine tissue in organ **C**. (1)

3.1.3 Describe the response that is carried out when a person has not eaten any sugar-containing food for six hours. (6)

(10)



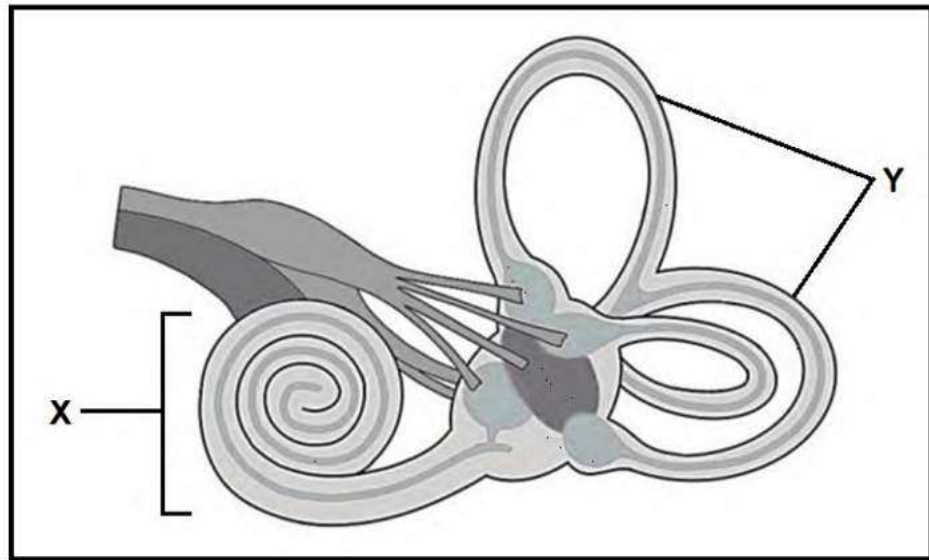
3.2 The diagram below shows a section of a human eye.



- 3.2.1 Give the LETTER and the NAME of the region where the clearest image is formed. (2)
 - 3.2.2 Using the LETTER and NAME, give the correct sequence through which light travels until it reaches part C. (3)
 - 3.2.3 Name and describe the changes that occur in the structures labelled E, and F when watching a movie in the cinema. (7)
- (12)



3.3 The diagram below represents part of the inner ear.



3.3.1 Identify part:

(a) X

(1)

(b) Y

(1)

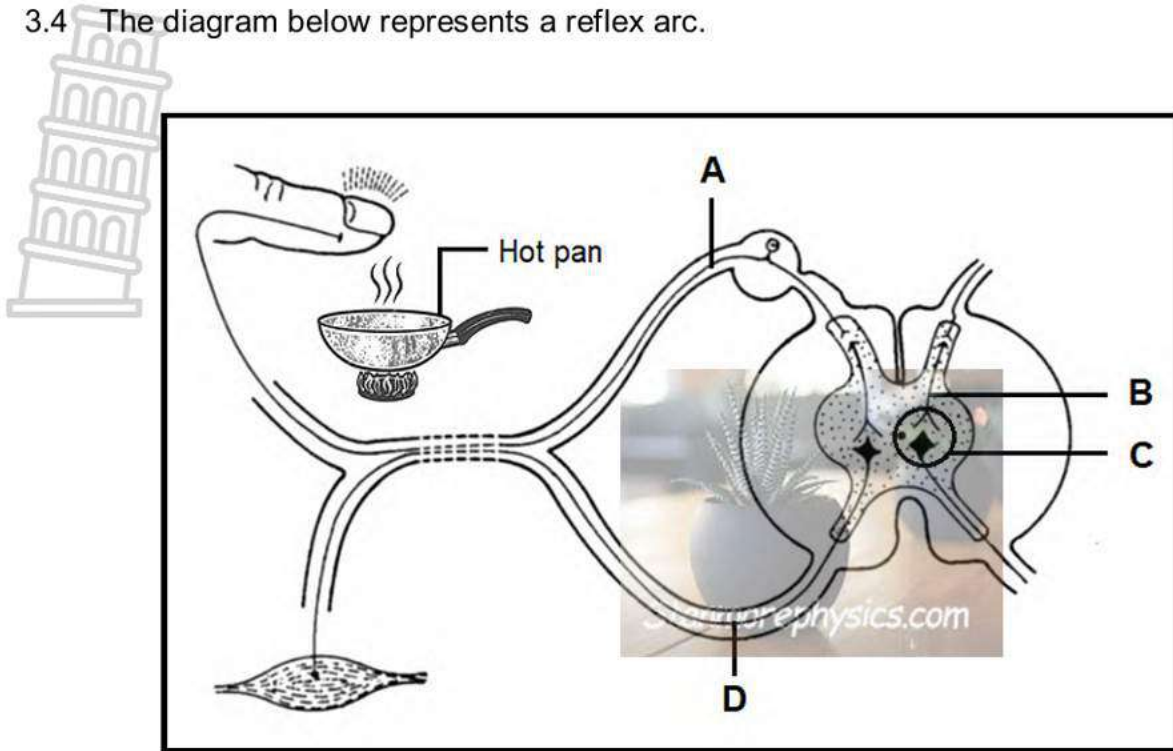
3.3.2 Describe the role of the parts of the ear from the time sound waves are trapped until pressure waves are set up in the inner ear.

(6)

(8)

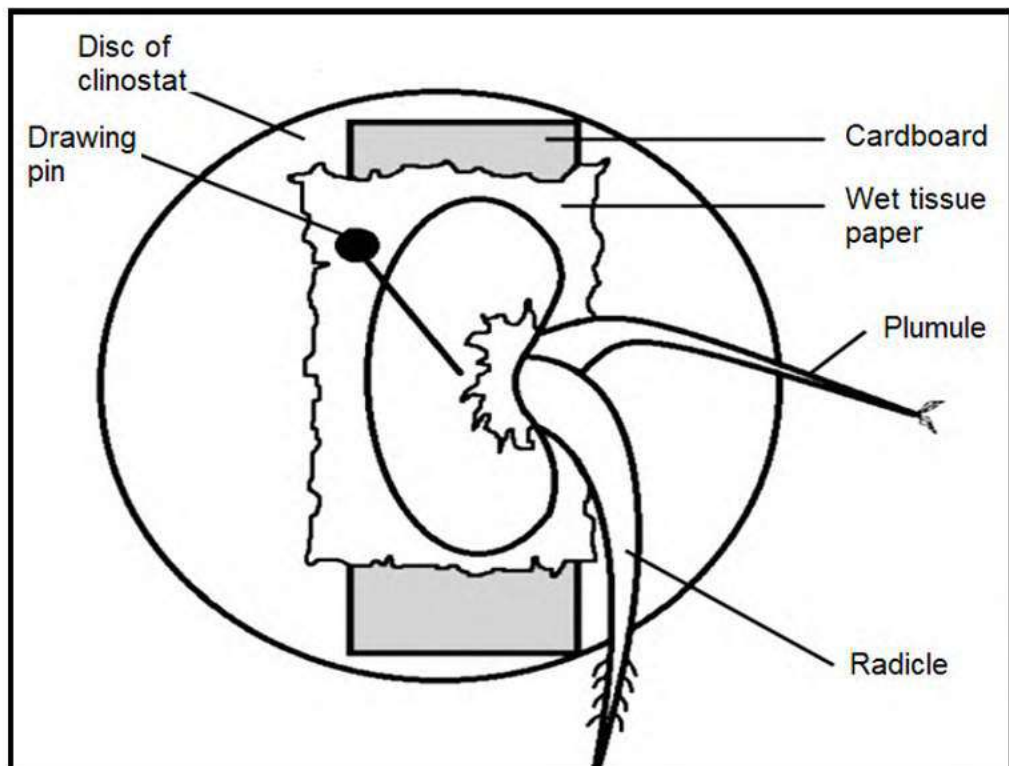


3.4 The diagram below represents a reflex arc.



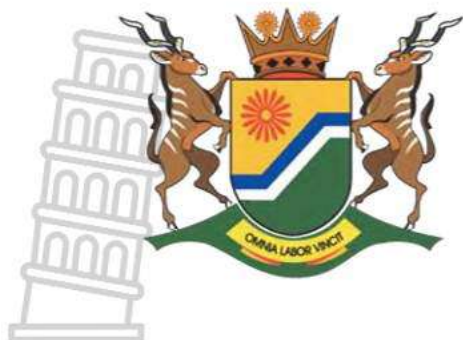
- 3.4.1 Define a *reflex arc* (1)
- 3.4.2 Identify the:
- (a) Functional connection at **C** (1)
- (b) Type of neuron at **B** (1)
- 3.4.3 State TWO significance of the connection mentioned in QUESTION 2.3.2(a). (2)
- 3.4.4 Name the neurons as they occur, in the correct sequence, from receptor to effector. (2)
- 3.4.5 Explain the consequences of a reflex action if neuron **D** is damaged. (2)
- 3.4.6 Draw a labelled diagram to represent the structure of neuron **A**. (5)
- (14)**

3.5 An experiment was conducted to investigate the direction of plumule growth when the germinating seed was placed vertically on a stationary clinostat as shown in the diagram below. The growing tips of the germinating seed were exposed to light from all directions. The wet tissue paper was periodically sprayed with water to keep the seed moist. The seed was kept in this position for four days. The tip of plumule began to bend and grew in an upward direction after four days.



- 3.5.1 Name the hormone that controls the direction of plumule growth in a germinating seed. (1)
- 3.5.2 Give a reason for exposing the germinating seed to light from all directions. (1)
- 3.5.3 Explain the direction of plumule growth as observed after four days. (3)
- 3.5.4 How does the control differ from the experiment? (1)
- (6)

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



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**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

**LIFE SCIENCES P1
SEPTEMBER 2024
MARKING GUIDELINES**

Stanmorephysics.com

MARKS: 150

This marking guideline 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
Marks for the first three irrespective of whether all or some are correct/incorrect.
3. **If whole process is given when only a part of it is required**
Read all and credit the relevant part.
4. **If comparisons are asked for but descriptions are given**
Accept if the differences/similarities are clear.
5. **If tabulation is required but paragraphs are given**
Candidates will lose marks for not tabulating.
6. **If diagrams are given with annotations when descriptions are required**
Candidates will lose marks.
7. **If flow charts are given instead of descriptions**
Candidates will lose marks.
8. **If sequence is muddled and links do not make sense**
Where sequence and links are correct, credit. Where sequence and links are incorrect, do not credit. If sequence and links become correct again, resume credit.
9. **Non-recognised abbreviations**
Accept if first defined in answer. If not defined, do not credit the unrecognised abbreviation but credit the rest of the answer if correct.
10. **Wrong numbering**
If answer fits into the correct sequence of questions but the wrong number is given, it is acceptable.
11. **If language used changes the intended meaning**
Do not accept.
12. **Spelling errors**
If recognisable, accept the answer, provided it does not mean something else in Life Sciences or if it is out of context.
13. **If common names are given in terminology**
Accept if it appears on marking guidelines.
14. **If only the letter is asked for but only the name is given (and vice versa)**
Do not credit.

15. **If units are not given in measurements**

Marking guidelines will allocate marks for units separately, except where it is given in the question.

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

17. **Caption**

All illustrations (diagrams, sketches, graphs, tables, etc.) must have a 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.

19. **Changes to the memorandum**

No changes must be made to the marking guideline without consulting the cluster leader who in turn will consult with the curriculum implementer.



SECTION A

QUESTION 1

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

- 1.2 1.2.1 Umbilical artery ✓
 1.2.2 Vagina ✓
 1.2.3 Amniotic fluid ✓
 1.2.4 Peripheral ✓ nervous system
 1.2.5 Abscisic acid ✓
 1.2.6 Anti-diuretic hormone ✓ / ADH
 1.2.7 Sensory ✓ neuron
 1.2.8 Organ of Corti ✓
 1.2.9 Homeostasis ✓
 1.2.10 Cataracts ✓
- 10 x 1 **(10)**

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

- 1.4 1.4.1 Ovipary ✓ / Oviparous (1)
 1.4.2 Precocial ✓ development (1)

- 1.4.3 - The eyes are open ✓
 - Legs are well developed ✓ / functional
 - It can feed on its own ✓
 - The down feathers are well developed ✓ / has feathers
- Any (3)

- 1.4.4 Internal ✓ fertilization (1)
(6)

- 1.5 1.5.1 B - Cerebellum ✓ (2)
 1.5.2 - Coordinates voluntary movement ✓
 - Controls balance and equilibrium ✓
(Mark first TWO only) (2)

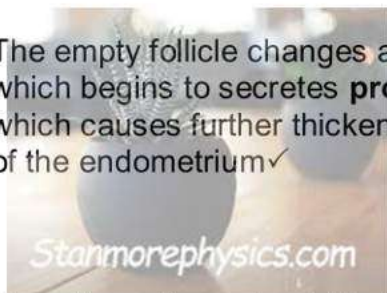
- 1.5.3 - Heart beat ✓
 - Breathing ✓
(Mark first TWO only) Any (2)
(6)

TOTAL SECTION A: 50

SECTION B**QUESTION 2**

- 2.1 2.1.1 A- Testis✓
 B- Epididymis✓
 C- Vas deferens✓/Sperm duct (3)
- 2.1.2 - Under the influence of testosterone✓
 - diploid cells✓/germinal epithelium
 - in the seminiferous tubules✓ of the testis
 - undergo meiosis✓
 - to form (haploid) sperm✓ Any (4)
- 2.1.3 - Tight underwear will pull the testes close to the body✓
 - The temperature of the testes will be too high✓/higher pressure on the testes
 - and sperm will not mature✓/sperm production is negatively affected
- OR**
- The testes will be away from the body✓
 - The temperature of the testes will therefore be lower than body temperature✓/less pressure on the testes
 - for successful sperm production✓ Any (2)
- 2.1.4 (a) - There will be no sperm transported through the vas deferens in the semen✓
 - therefore, no fertilisation can take place✓ (2)
- (b) - The fluid part of the semen will still be produced✓
 - by the accessory glands✓/seminal vesicles/prostate gland/Cowper's glands (2)
- (13)**
- 2.2 2.2.1 Day 14✓ (1)
- 2.2.2 - Oestrogen✓
 - FSH✓ (2)
- 2.2.3 -The follicle develops✓ during this period stimulated by increased levels of FSH
 -The lining of the endometrium thickens✓ during this period stimulated by increased levels of oestrogen (2)
- 2.2.4 - Corpus luteum has not disintegrated✓
 - and the endometrial lining remains thickened✓ (2)

- 2.2.5 - The pituitary gland ✓
 - secretes **LH** ✓
 - which causes the Graafian follicle to rupture and release the ovum ✓
 - This is called ovulation ✓
 - The empty follicle changes and becomes a corpus luteum ✓
 - which begins to secrete **progesterone** ✓
 - which causes further thickening ✓
 - of the endometrium ✓



Any (6)
(13)

- 2.3 2.3.1 Allows flow of menstrual blood from the uterus to the vagina ✓
 Opening of uterus that seals with mucus plug during gestation ✓
 Widens during labour to release foetus ✓ Any (1)
- 2.3.2 Antibiotics ✓ (1)
- 2.3.3 To dilate the cervix in order allow fertilisation to take place ✓ / woman to fall pregnant (1)
- 2.3.4 - cervix will be blocked ✓
 - preventing sperms from moving up the uterus ✓
 - hence fertilisation could not take place ✓ (3)
(6)
- 2.4 2.4.1 Cold environmental conditions ✓ (1)
- 2.4.2 - Blood vessels dilate ✓ / blood vessels become wider / vasodilation occurs
 - More blood flows to the surface of the skin ✓
 - More heat is lost from the skin ✓ (3)
- 2.4.3 - As the environmental temperature increases above body temperature
 - increased sweating will occur ✓
 - As the sweat is evaporated ✓
 - it allows the body temperature to decrease ✓ / more cooling of the skin will occur. Any (3)
- 2.4.4 $\frac{38 - 30}{30} \times 100$ ✓
 = 26,67% ✓ (accept 26,7% or 27%) (3)
(10)



- 2.5 2.5.1 (a) Amount of thyroxin✓ (1)
- (b) Mass of rats✓ (1)
- 2.5.2 - Group 1✓
- Group 3✓ (2)
- 2.5.3 - environment✓
- amount of water✓ (2)
- 2.5.4 - presence of thyroxin decreases the mass of rats and increases oxygen consumption✓✓
OR
- the absence of thyroxin increases the mass of rats and decreases oxygen consumption✓✓ (2)

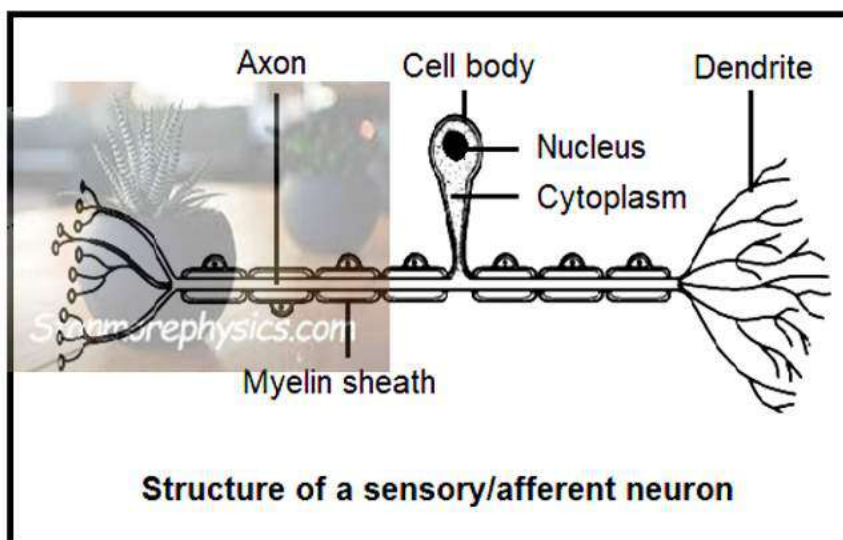
TOTAL QUESTION 2 (8)
[50]



QUESTION 3

- 3.1 3.1.1 A- Glucagon✓
B- Insulin✓ (2)
- 3.1.2 (a) Pancreas✓ (1)
- (b) Islets of Langerhans✓ (1)
- 3.1.3 - Negative feedback reaction✓
- The glucose concentration in the blood drops below normal✓
- The alpha cells/ islets of Langerhans/pancreas detect the drop and secretes glucagon✓
- In the blood✓
- Which is transported to the liver✓/muscle cells
- Glucagon stimulates the conversion of glycogen to glucose✓
- The glucose concentration in the blood returns to normal✓ (6)
- (10)
- 3.2 3.2.1 C✓- Yellow spot✓/ fovea centralis (2)
- 3.2.2 Light has to pass through **D**, the cornea✓, **E** the pupil✓ and **B**, the lens✓ before reaching **A**, the retina.
(The learner must give the name and letter for each structure to get the mark.) (3)
- 3.2.3 **Pupillary mechanism**✓*
- Circular muscle✓ of the iris relax✓
- radial muscle✓ of the iris contract✓
- Pupil size increases✓/ dilate
- More light enters the eye✓
- *1 compulsory mark + Any 6 (7)
- (12)
- 3.3 3.3.1 (a) Cochlea✓ (1)
- (b) Semi-circular canals✓ (1)
- 3.3.2 - The pinna directs sound waves✓
- into the auditory canal✓
- The auditory canal transmits sound waves to the tympanic membrane✓
- The tympanic membrane transmits vibrations to the ossicles✓ as vibrations
- The ossicles transmit amplified vibrations✓
- to the oval window✓
- which vibrates✓ and set pressure waves in the inner ear (6)
- (8)

- 3.4 3.4.1 A pathway taken by an impulse from a receptor to the effector to bring about the response to a stimulus✓ (1)
- 3.4.2 (a) Synapse✓/Synaptic gap (1)
- (b) Connector neuron✓/ Inter-neuron (1)
- 3.4.3 - It ensures that the impulse moves in one direction only✓
- It prevents continuous stimulation of the neuron✓/ filters weak or constant impulses
- able to transfer impulses to multiple neurons simultaneously✓
(Mark first ONE only) Any (1)
- 3.4.4 Sensory neuron→ Connector/ interneuron→ Motor neuron✓✓ (2)
- 3.4.5 - The person will be able to receive a stimulus✓
- but will not be able to respond to it✓ (2)
- 3.4.6



CRITERION	MARK ALLOCATION
Caption (C)	1
Correct diagram (D)	1
Any 3 correct labels (L)	3

(5)
(14)

3.5

3.5.1

Auxins✓

(1)

3.5.2

To cancel the effect of unilateral light on plumule growth✓/ to show that the light has no effect on the upward bending of plumule/ to exclude a phototropic response

(1)

3.5.3

When a plumule is placed horizontally:

- Auxins are attracted by gravity✓
- There is a high concentration of Auxins on the lower side of the plumule✓
- Which stimulates growth/ cell elongation/ cell division on the lower side✓
- There is a low concentration of Auxins on the upper side of the plumule✓
- Which inhibits growth/ cell elongation/ cell division on the upper sides✓
- The lower side of the plumule grows faster✓/ uneven growth occurs causing the plumule to grow/ bend upwards
- The plumule grows away from gravity✓/ the plumule is negatively geotropic

(3)

3.5.4

The germinating seed is attached to the disc of rotating clinostat✓

(1)

(6)**TOTAL QUESTION 3 [50]****TOTAL SECTION B: 100****GRAND TOTAL: 150**