



GAUTENG PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

**JUNE EXAMINATION
GRADE 12**

2024

LIFE SCIENCES

Stanmorephysics.com

TIME: 2½ hours

MARKS: 150

19 pages

LIFE SCIENCES P1



C2831E

X05



INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

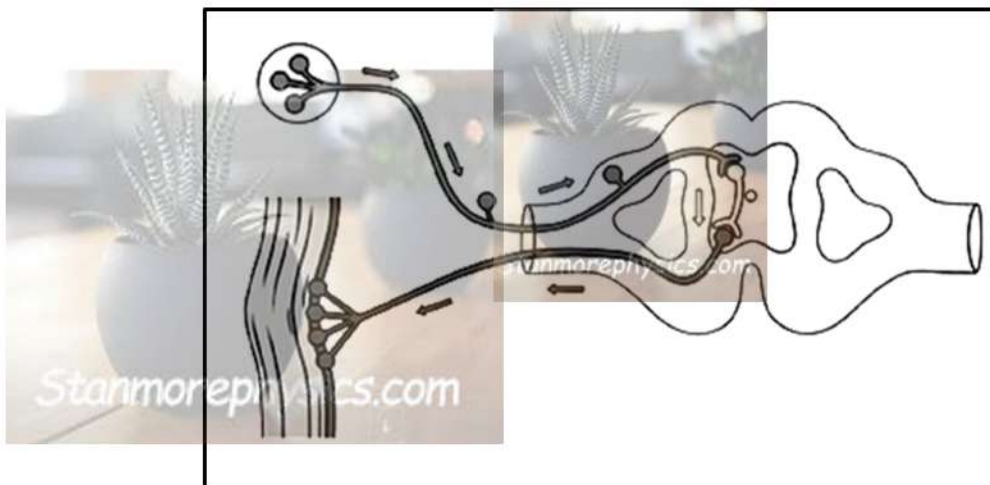
1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK.
3. Start the answers to EACH question at the top of a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Present your answers according to the instructions of each question.
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 must use a non-programmable calculator, protractor and a compass, where necessary.
11. Write neatly and legibly.

SECTION A

QUESTION 1

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

Questions 1.1.1 and 1.1.2 are based on the diagram below.



- 1.1.1 The correct order in which the impulses travel in the diagram above is ...

- A receptor, interneuron, sensory neuron, motor neuron, effector.
- B receptor, effector, motor neuron, interneuron, sensory neuron.
- C receptor, motor neuron, interneuron, sensory neuron.
- D receptor, sensory neuron, interneuron, motor neuron.

- 1.1.2 The pathway shown in the diagram is known as the ...

- A reflex action.
- B reflex pathway.
- C reflex arc.
- D reaction.

- 1.1.3 Which part of the brain is responsible for interpreting hearing?

- A Cerebellum
- B Cerebrum
- C Corpus callosum
- D Medulla oblongata

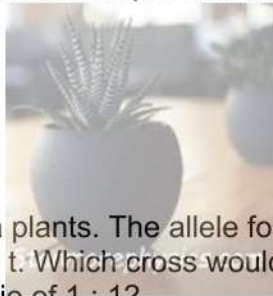


1.1.4 In guinea pigs, one parent had black fur and the other had white fur. The resulting offspring were all grey. This interaction between the F1 alleles that resulted in the grey fur colour can be referred to as:

- A Complete dominance
- B Incomplete dominance
- C Co-dominance
- D Crossing over

1.1.5 Which of the following is an example of a chromosomal mutation?

- A Albinism
- B Colour blindness
- C Down syndrome
- D Haemophilia



1.1.6 A farmer is growing pea plants. The allele for tall plants is T, and the allele for dwarf plants is t. Which cross would need to be carried out to ensure a phenotypic ratio of 1 : 1?

- A $tt \times tt$
- B $Tt \times Tt$
- C $TT \times Tt$
- D $Tt \times tt$

1.1.7 The microscopic structures that carry out a part of protein synthesis under the control of the nucleus are ...

- A ribosomes.
- B chloroplasts.
- C mitochondria.
- D cell walls.

1.1.8 The ABO blood groups are an inherited characteristic.

What would the possible blood group of the offspring be when the parents have the genotypes $I^A I^A$ and $I^A i$?

- A Group O only
- B Group A and group O
- C Group AB only.
- D Group A only

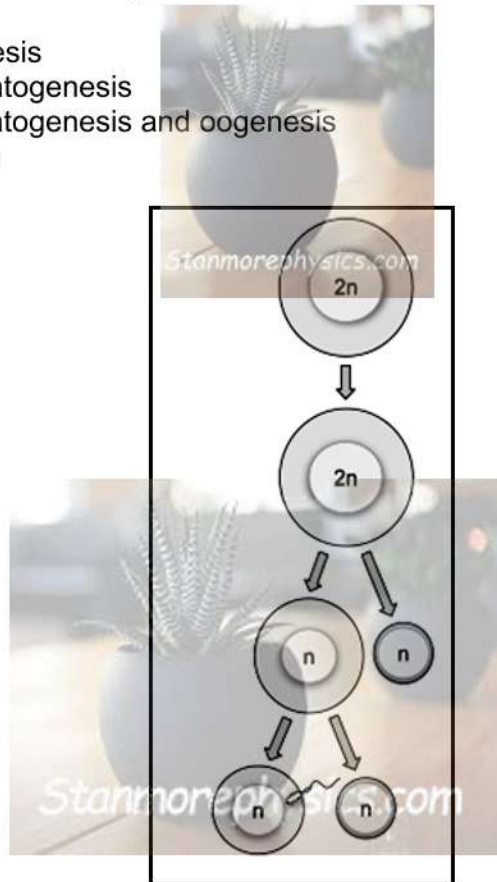


1.1.9 What are the receptors in the ear responsible for maintaining balance called?

- A Organ of corti and cristae
- B Oval window and round window
- C Maculae and cristae
- D Maculae and eustachian tube

1.1.10 The diagram below represents:

- A Oogenesis
- B Spermatogenesis
- C Spermatogenesis and oogenesis
- D Meiosis



(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 attachment of the developing embryo to the uterine lining

1.2.2 The manipulation of biological processes to satisfy human needs

1.2.3 The type of inheritance where both alleles are equally dominant

1.2.4 The point of crossing over between homologous chromosomes

1.2.5 A diagram showing the inheritance of genetic disorders over many generations

1.2.6 The process whereby the eye adjusts to the amount of light

1.2.7 The part of the ear that equalises pressure on either side of the tympanic membrane

1.2.8 The bundle of nerves that connects the brain's two hemispheres

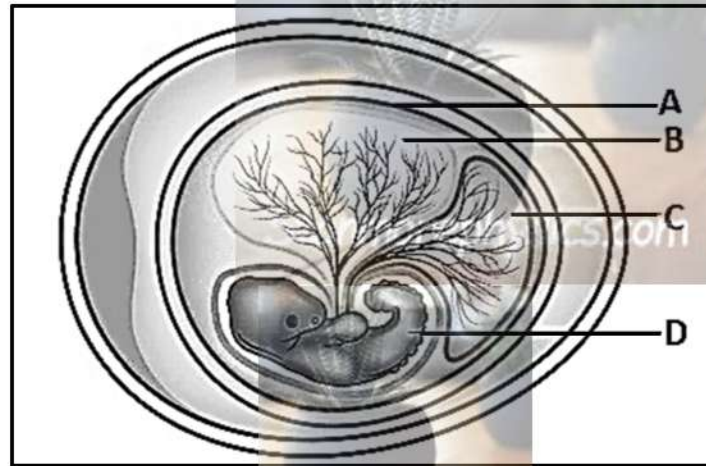
(8 x 1) (8)

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 numbers (1.3.1 to 1.3.4) in the ANSWER BOOK.

COLUMN I		COLUMN II	
1.3.1	The structure that gives rise to spindle fibres during meiosis and mitosis in animals	A:	Centrioles
		B:	Centromeres
1.3.2	A possible gamete in a dihybrid cross	A:	H
		B:	HhBb
1.3.3	Alleles of blood groups	A:	Complete dominance
		B:	Co-dominance
1.3.4	The location of DNA	A:	Mitochondria
		B:	Chloroplast

(4 x 2) (8)

1.4 The diagram below shows the embryonic development in birds.



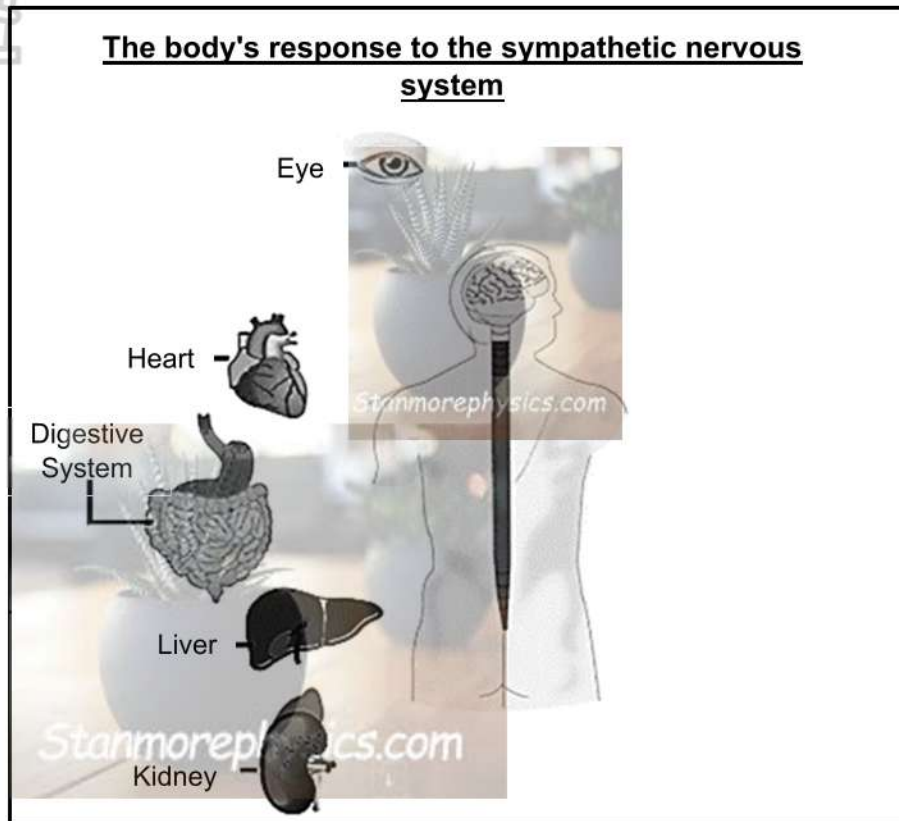
1.4.1 Name the type of embryonic development shown in the diagram above. (1)

1.4.2 Give the LETTER ONLY of the part that:

- (a) Nourishes the embryo
- (b) Stores and removes waste
- (c) Protects the growing embryo (3)

1.4.3 State TWO physical characteristics of a precocial chick upon hatching. (2)
(6)

- 1.5 A learner is caught while truanting (bunking) from his Life Sciences class. A teacher yells out to him to go back to class. He knows he is going to be in trouble both at school and home. He considers going back to class, but as the teacher approaches, he decides to run away. The diagram below shows organs in the body responding to the sympathetic nervous system.



- 1.5.1 Describe how the learner's sympathetic nervous system helps him to escape with regard to the following organs:
- (a) The eye (1)
 - (b) The heart (1)
 - (c) The liver (1)
- 1.5.2 Explain the role that the gland attached to the kidney plays in the sympathetic nervous system. (2)
- 1.5.3 Name the process that will increase in the cells during a sympathetic response. (1)
- 1.5.4 Identify the purpose of the increase in the process mentioned in QUESTION 1.5.3. (1)
- 1.5.5 Name the branch of the nervous system that allows the learner to calm down once he is far away from the teacher. (1)

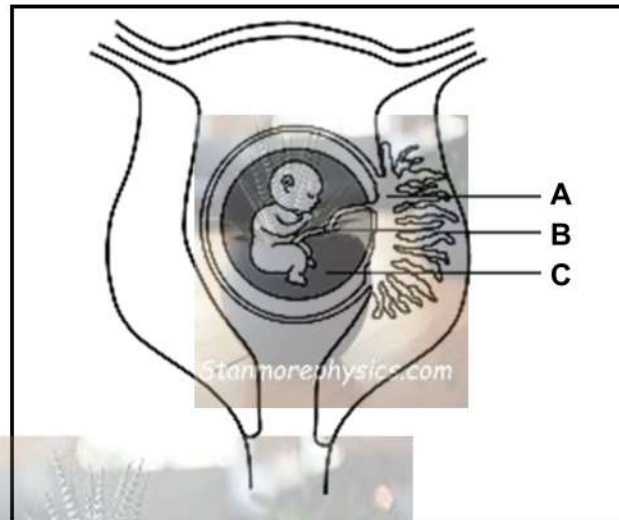
(8)

TOTAL SECTION A 50

SECTION B

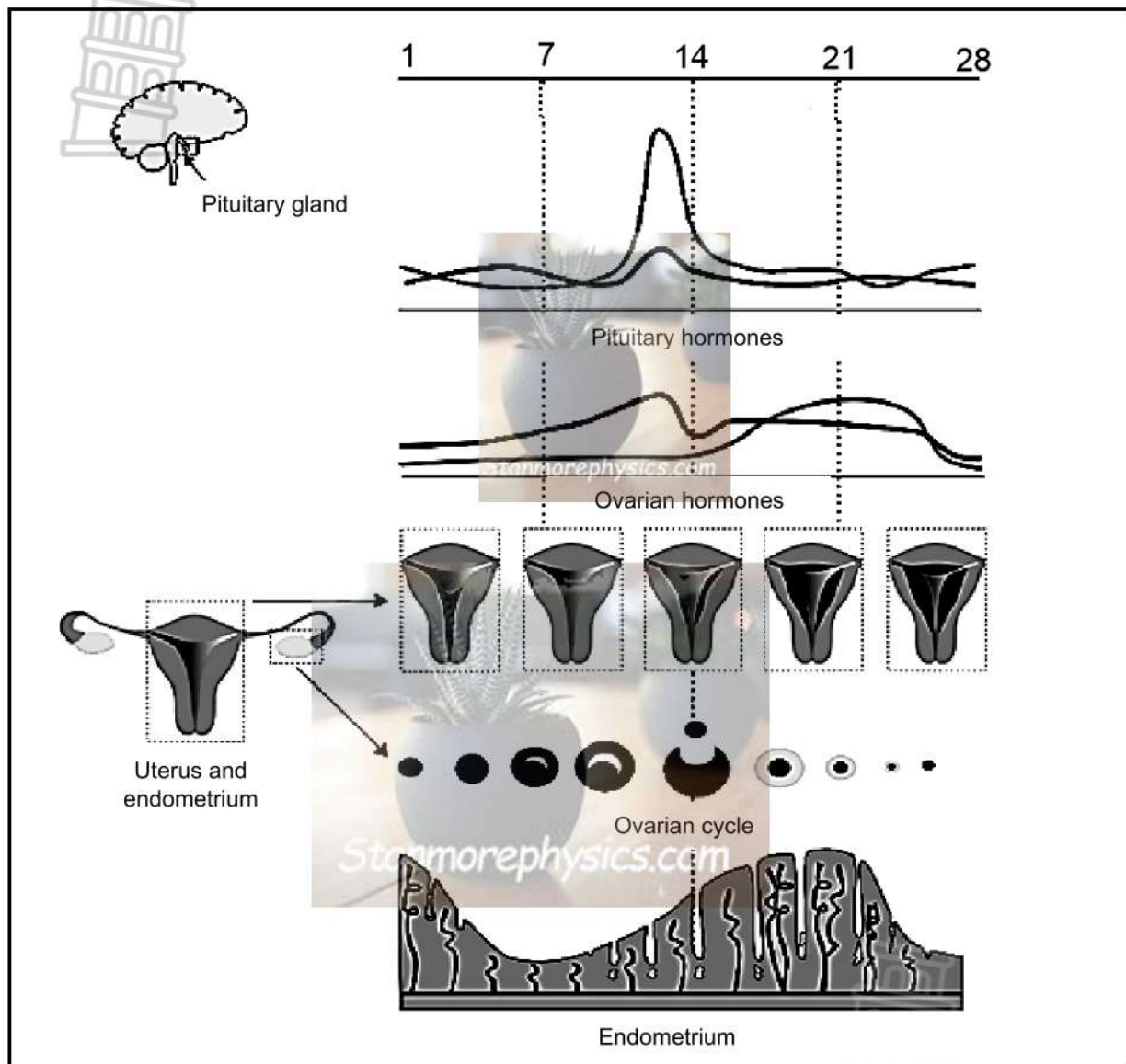
QUESTION 2

2.1 The diagram below shows a developing foetus in the uterus.



- 2.1.1 Name the hormone that is produced by structure **A** during pregnancy. (1)
- 2.1.2 Describe the consequence for the foetus if structure **A** should produce an insufficient amount of the hormone mentioned in QUESTION 2.1.1. (2)
- 2.1.3 The foetus's lungs are not fully developed for gaseous exchange during the gestation period. Give the **NAME** and **LETTER** of the part that serves as the pathway for transporting gases from the mother to the foetus and vice versa. (2)
- 2.1.4 Explain how the developing foetus would be affected if the membranes around structure **C** were to tear. (4)
- (9)

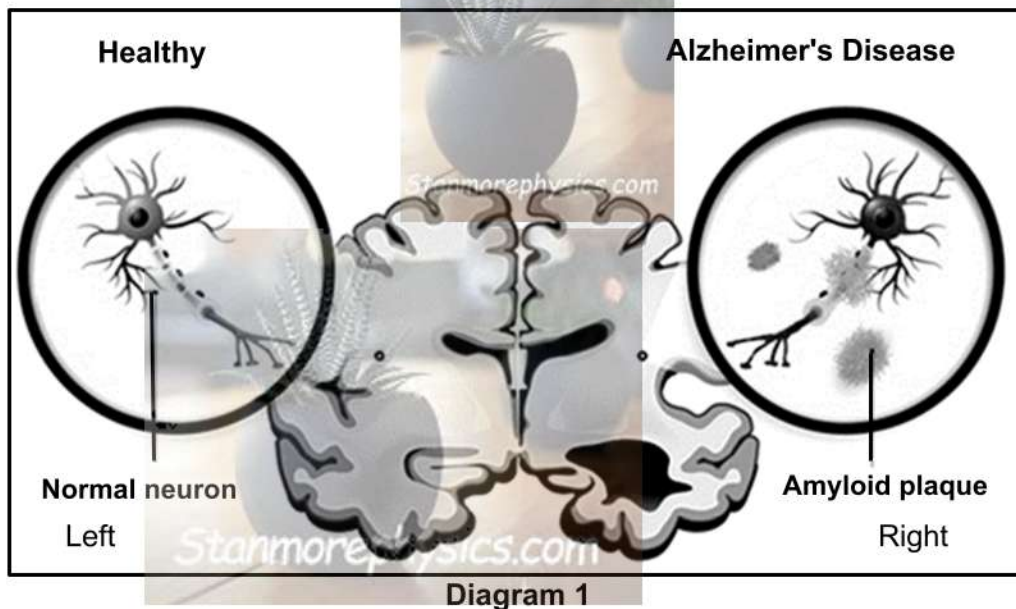
2.2 The diagram below shows the hormonal control of the menstrual cycle.



- 2.2.1 Name the pituitary hormone which shows a sharp increase just before the 14th day of the menstrual cycle. (1)
- 2.2.2 Describe the functions of the hormone mentioned in QUESTION 2.2.1. (2)
- 2.2.3 Name the hormone that causes the endometrium to start thickening from day 7 and state ONE other function of this hormone. (2)
- 2.2.4 Name the TWO ovarian hormones and state their origin. (4)
- (9)

2.3 Study the text and diagrams 1 and 2 below and answer the questions that follow.

The diagram below shows a contrast between a healthy brain (left) and a brain with Alzheimer's disease (right). The exact cause of the disorder is not yet established. However, several pieces of evidence show the involvement of genetics, lifestyle-related factors, and environmental factors. The brain tissues of Alzheimer's patients are typically shrunken. In the Alzheimer's brain, abnormal levels of a naturally occurring protein clump together to form amyloid plaques that collect between neurons and disrupt cell function. This causes synaptic loss and eventually results in the death of brain cells. These changes at the cellular level result in the symptoms of Alzheimer's.



- 2.3.1 Identify ONE structural problem of an Alzheimer's brain mentioned in the text above. (1)
- 2.3.2 Identify the type of neuron depicted in the diagram above. (1)
- 2.3.3 Name the membrane that surrounds the axon and state its function. (2)
- 2.3.4 State TWO symptoms of Alzheimer's disease. (2)



The diagram below shows the transmission of impulses between two neurons.

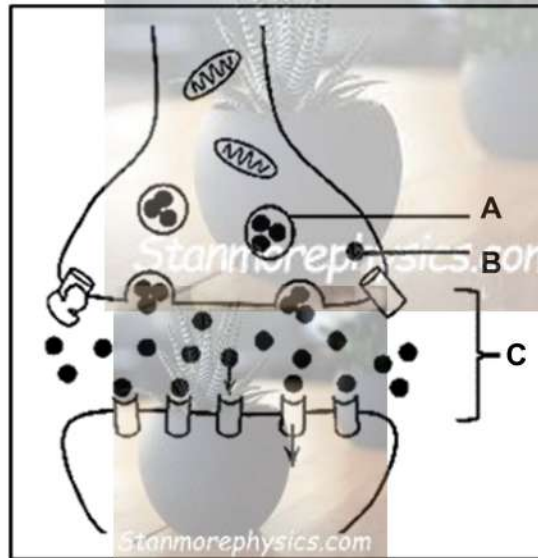
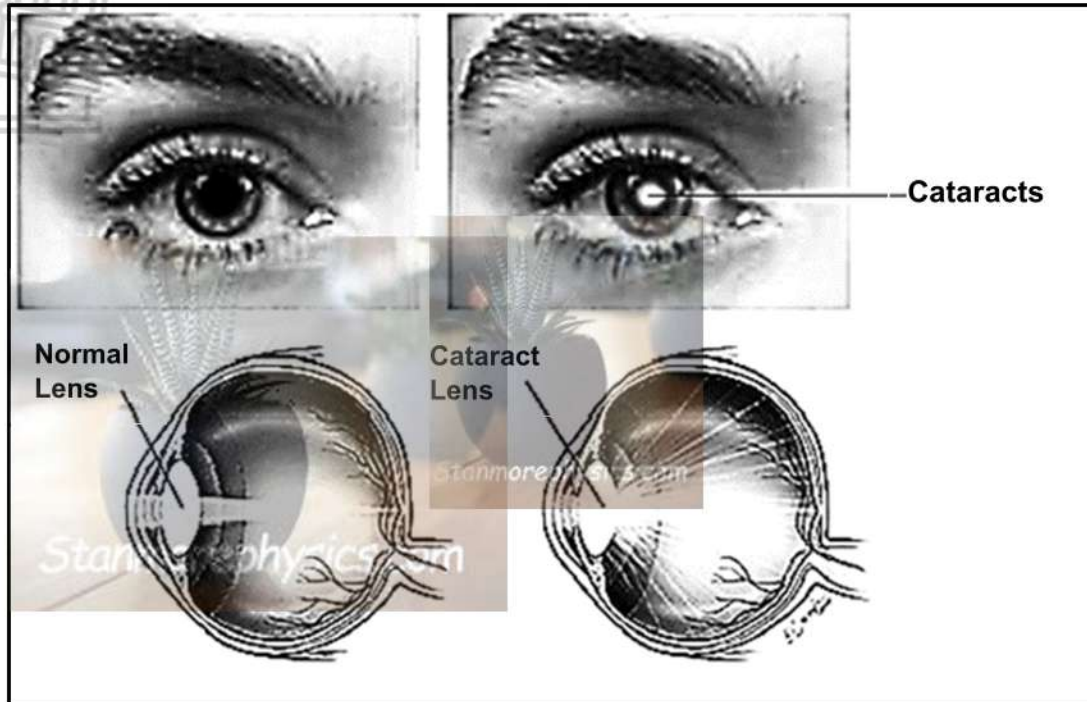


Diagram 2

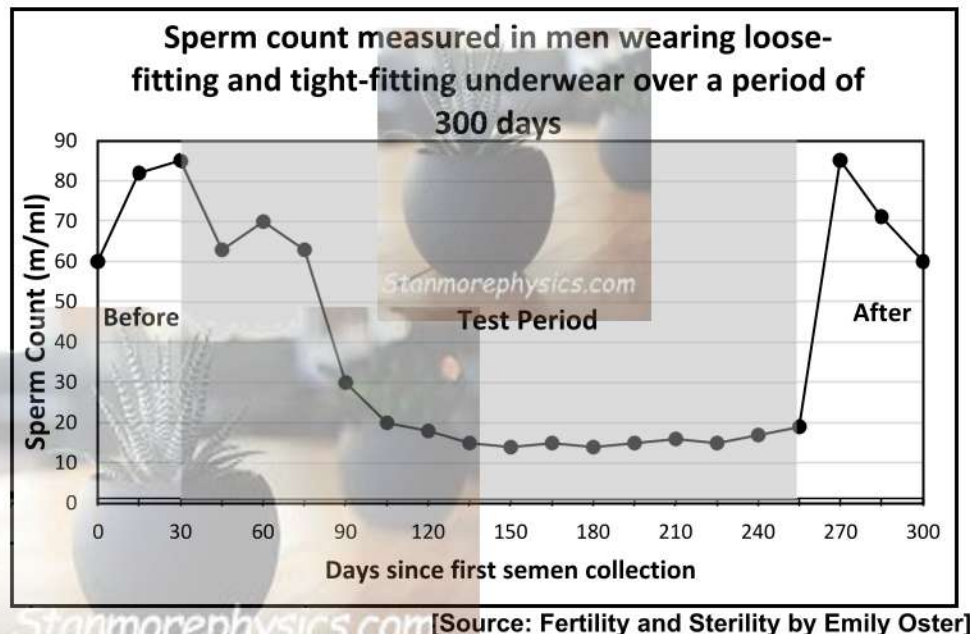
- 2.3.5 The information in the passage states that Alzheimer's results in synaptic loss. Give the LETTER of the region in diagram 2 which represents the synapse. (1)
- 2.3.6 State the significance of the synapse and identify the specific area where its loss might lead to the Alzheimer's symptoms mentioned in QUESTION 2.3.4. (2)
- 2.3.7 Name the part of a neuron that:
- (a) Transmits impulses to the cell body (1)
 - (b) Transmits impulses away from the cell body (1)
- (11)**

2.4 The diagram below show the contrast between a normal eye and an eye with a cataract.



- 2.4.1 Tabulate TWO differences between the normal eye and the cataract eye as observed in the diagram. (5)
- 2.4.2 Name the treatment recommended for cataracts. (1)
- 2.4.3 Name and describe the process that causes the lens of the normal eye to adjust to an object that is seen less than 6 meters away after having been focussed on a distant bird. (5)
- (11)**

- 2.5 Five men who normally wear loose-fitting underwear were selected to be part of an investigation. The five men in the study were asked to wear specially designed underwear that was tight-fitting for 14 to 16 hours every day for seven and a half months (the test period). The underwear kept the scrotum and testicles very close to the body. The men provided a sperm sample several times leading up to the test period, several times during the test period and several times after the test period. The chart below shows the average sperm count (million per millilitres (m/ml)) before, during and after the test period.



2.5.1 State the:

- (a) Independent variable
(b) Dependant variable

(2)

2.5.2 Besides repeating the experiment, suggest how this investigation could be made more reliable.

(1)

2.5.3 Explain how tight-fitting underwear has affected the sperm count.

(3)

2.5.4 Suggest why the sperm count was measured before the test period started.

(2)

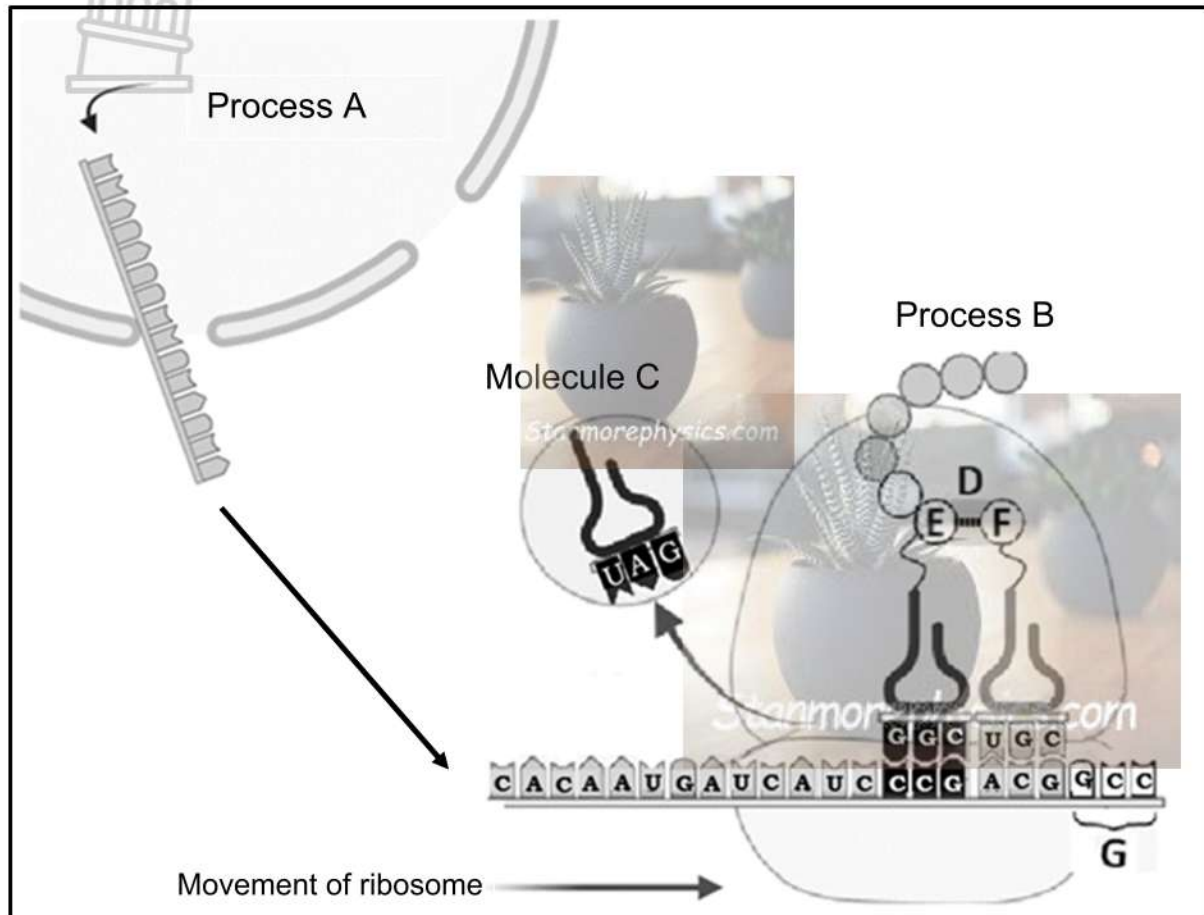
2.5.5 Determine what the scientists analysed during days 30 – 255.

(2)

(10)
[50]

QUESTION 3

3.1 The diagram below shows two processes that take place in all cells of the body.



- 3.1.1 Provide a heading for the entire process illustrated above. (1)
- 3.1.2 Name processes **A** and **B** respectively. (2)
- 3.1.3 Briefly describe the role of Molecule **C** in Process **B**. (3)

3.1.4 The table below shows different tRNA anti-codons and their corresponding amino acids.

Table 1: List of amino acids with the corresponding anti-codons

tRNA ANTICODON	AMINO ACID
GGC	Proline
CGU	Alanine
UGC	Threonine
CCG	Glycine
ACG	Cysteine
CGG	Alanine

- (a) Provide a label for chemical bond **D**. (1)
(b) Identify the amino acids **E** and **F** respectively. (2)

3.1.5 Provide the DNA triplet code that would have coded for codon **G**. (2)

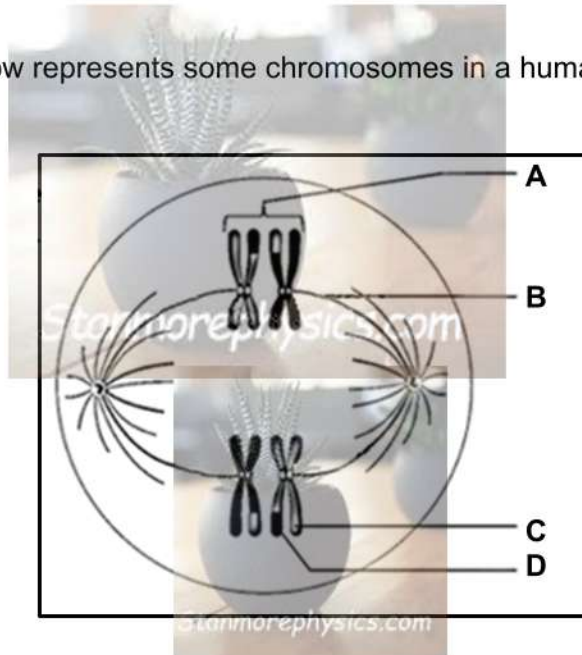
3.1.6 During DNA replication, one nucleotide might be placed in the wrong position on the forming complementary DNA strand.

- (a) Name this type of mutation. (1)

If the DNA triplet code that resulted in codon **G** were to undergo the type of mutation mentioned in QUESTION 3.1.6 a), and the DNA triplet changes to CGT, then

- (b) Explain the effect that this would have on the resulting protein. (4)
(16)

3.2 The diagram below represents some chromosomes in a human cell in a phase of meiosis.



- 3.2.1 Provide labels for **A** and **B**. (2)
- 3.2.2 (a) Identify the phase of meiosis represented above. (1)
 (b) Provide ONE visible reason for your answer to QUESTION 3.2.2(a). (2)
- 3.2.3 Name and describe the process that resulted in parts **C** and **D** being different to each other. (4)
- 3.2.4 State the importance of the process named in QUESTION 3.2.3. (1)
- 3.2.5 How many chromosomes would normally be present in each daughter cell once the human cell above has completed meiosis? (1)
- 3.2.6 At the end of the process of meiosis, one of the daughter cells had an extra chromosome 21. Describe how this may have occurred. (2)
- (13)**

- 3.3 The table below shows the results obtained in an investigation where a pure-bred black mouse was crossed with a brown mouse.

The gene for black fur is dominant over the gene for brown fur.

The F₁ generation was then used as parents. Four breeding pairs were used, and the results of the F₂ generation can be seen in the table.

Table 2: Results of investigation

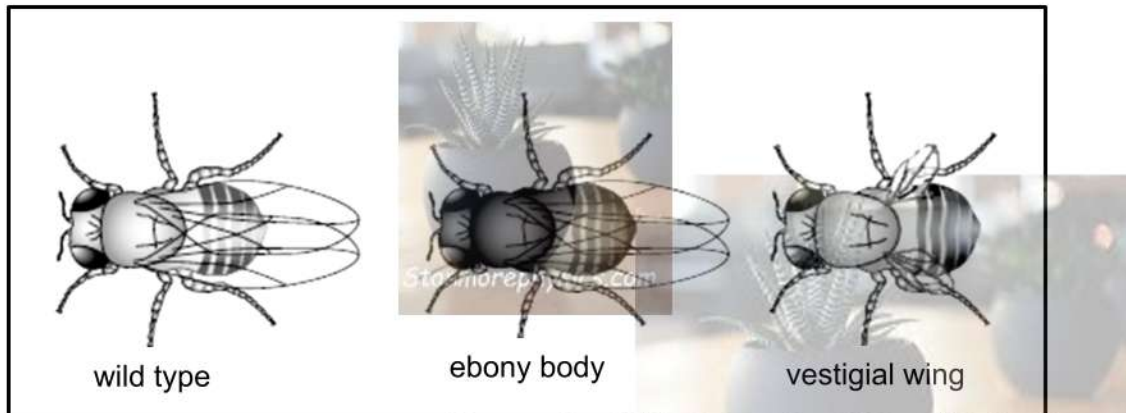
	NUMBER OF BLACK MICE	NUMBER OF BROWN MICE
Parents (P₁)	1	1
F₁ generation	8	0
F₂ generation		
Offspring of first breeding pair	8	0
Offspring of second breeding pair	5	3
Offspring of third breeding pair	3	3
Offspring of fourth breeding pair	8	2

- 3.3.1 From the data collected, calculate the simplified phenotypic ratio of black mice to brown mice in the F₂ generation. Show all calculations. (2)
- 3.3.2 Provide evidence from the data collected, that supports the following statement:
The gene for black fur is dominant over the gene for brown fur. (2)
- 3.3.3 Draw a bar graph to show the phenotypic results of the F₂ generation for each breeding pair. (6)
- (10)**

- 3.4 The fruit fly: *Drosophila melanogaster*, feeds on sugars found in damaged fruit. A fruit fly with normal features is called a 'wild type', and it has a grey striped body with wings longer than its abdomen.

There are mutant variations of the *D. melanogaster*, such as an ebony (dark) body, or presence of vestigial (small) wings. The three types are shown in the image below.

The diagram shows three phenotypes of *D. melanogaster*.



[Source: Cambridge international A-Level Biology]

The 'wild type' features are coded for by dominant alleles:

G for 'wild type' body colour.

L for 'wild type' wings size.

- 3.4.1 Define the term *allele*. (1)
- 3.4.2 Some mutant variations of the *D. melanogaster* were a result of differing numbers of chromosomes in their genotype. Name this type of mutation. (1)
- 3.4.3 When two fruit flies with 'wild type' body colour were crossed, some of the F₁ generation had an ebony body colour. Use a monohybrid genetic cross to show the percentage chance of the offspring having an ebony body. (6)
- 3.4.4 Name the type of cross which would compare body colour and wing size at the same time. (1)
- 3.4.5 A particular fly has the genotype Ggll. Identify its phenotype. (2)

(11)

[50]

TOTAL SECTION B: 100

TOTAL: 150



**JUNE EXAMINATION
GRADE 12**

2024

MARKING GUIDELINES

LIFE SCIENCES

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14 pages

PRINCIPLES RELATING TO THE MARKING OF LIFE SCIENCES

1. **If more information than marks allocated is given**
Stop marking when maximum marks are reached and place a wavy line and 'max' in the right-hand margin.
2. **If, for example, three reasons are required and five are given**
Mark only 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 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, 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 memo discussion meeting.
14. **If only the letter is asked for, but only the name is given (and vice versa)**
Do not credit.
15. **If units are not given in measurements**
Candidates will lose marks. Marking guidelines will allocate marks for units separately.
16. **Be sensitive to the sense of an answer, which may be stated in a different way.**
17. **Caption**
All illustrations (diagrams, graphs, tables, etc.) must have a caption.
18. **Code-switching of official languages (terms and concepts)**
A single word or two that appear(s) in any official language other than the learners' assessment language used to the greatest extent in his/her answers should be credited, if it is correct. A marker that is proficient in the relevant official language should be consulted. This is applicable to all official languages.
19. **Changes to the marking guidelines**
No changes must be made to the marking guidelines without consulting the provincial internal moderator.



AMENDMENT TO MARKING GUIDELINES JUNE 2024 PROVINCIAL EXAMINATION

ATTENTION

THE CHIEF INVIGILATOR

SUBJECT / VAK	LIFE SCIENCES / LEWENSWETENSKAPPE
DATE OF EXAMINATION	5 JUNE / JUNIE 2024


The errata for the Marking Guidelines of LIFE SCIENCES has reference.

There are notes to the marking guidelines which appear at the end of this document. These matters were addressed at the Marking Standardisation Meeting.

To ensure that candidates are not disadvantaged nor prejudiced in way, you are advised to please mark the paper out of 148 marks instead of 150 and then the learners' marks must be converted to a mark out of 150. E.g., Should a learner attain 85/148 then that mark is recalculated as 86/150.

Use the formula: $\frac{a}{148} \times 100 = b$. Then, $\frac{b}{100} \times 150 = c$

C is the mark that is entered into SASAMS out of 150.


 Mr. Jonathan Williams

DIRECTOR: EXAMINATIONS MANAGEMENT
5 JUNE 2024

SECTION A

QUESTION 1

1.1 1.1.1 D ✓✓

1.1.2 C ✓✓

1.1.3 B ✓✓

1.1.4 B ✓✓

1.1.5 C ✓✓

1.1.6 D ✓✓

1.1.7 A ✓✓

1.1.8 D ✓✓

1.1.9 C ✓✓

1.1.10 A ✓✓

(10 x 2) (20)

1.2 1.2.1 Implantation ✓/chorionic villi

1.2.2 Biotechnology ✓

1.2.3 Co-dominance ✓

1.2.4 Chiasma ✓/Chiasmata

1.2.5 Pedigree ✓ diagram

1.2.6 Pupillary mechanism ✓

1.2.7 Eustachian tube ✓

1.2.8 Corpus callosum ✓

(8 x 1) (8)

1.3 1.3.1 A only ✓✓

1.3.2 None ✓✓

1.3.3 Both A and B ✓✓

1.3.4 Both A and B ✓✓

(4 x 2) (8)

- 1.4 1.4.1 Ovipary ✓ (1)
- 1.4.2 (a) B ✓
(b) C ✓
(c) A ✓ (3)
- 1.4.3 - Well developed body ✓
- Young born with eyes open ✓/able to see,
- covered in (down) feathers ✓,
- mobile ✓ when born. (2)
(Mark first TWO only) (6)
- 1.5 1.5.1 (a) Pupil dilates ✓ (1)
(b) Beats faster ✓/increases heart rate (1)
(c) Coverts stored glycogen into glucose ✓ (1)
- 1.5.2 **QUESTION REMOVED, the paper will be marked out of 148** (2)
- 1.5.3 Cellular respiration ✓ (1)
- 1.5.4 To increase energy ✓/more ATP production (1)
- 1.5.5 Parasympathetic ✓ nervous system (1)
(6)

TOTAL SECTION A: 48

SECTION B

QUESTION 2

- 2.1 2.1.1 Progesterone ✓ (1)
- 2.1.2 - Endometrium/placenta will not be maintained ✓
 - therefore it will disintegrate/breakdown ✓
 - It could also cause contractions ✓
 - resulting in a possible miscarriage ✓ Any (2 x 1) (2)
- 2.1.3 B ✓ – Umbilical cord ✓ (2)
- 2.1.4 **There is less fluid** * ✓
 - A constant temperature would not be maintained. ✓
 - There would no/less shock absorption. ✓
 - There would be increased chance of mechanical injury. ✓
 - The foetus could dehydrate/desiccate. ✓
 - Movement of the foetus would be limited ✓/cause more friction
 Any 3 + 1 compulsory mark * (4)
(9)
- 2.2 2.2.1 LH ✓/Lutenising hormone (1)
- 2.2.2 - Causes ovulation ✓/releasing of ovum from (graafian) follicle
 - Causes formation of the corpus luteum ✓ (2)
- 2.2.3 Oestrogen ✓
 Stimulates production of LH ✓/responsible for the development of
 secondary characteristics (2)
- 2.2.4 - Graafian/developing follicle ✓ matures and
 - produces oestrogen ✓
 - The corpus luteum ✓ is formed
 - which produces progesterone ✓ (4)
(9)

- 2.3 2.3.1 - Brain tissue is generally shrunken ✓
 - Abnormal levels of a naturally occurring protein clumps together to form Amyloid plaques ✓ that collect between neurons
 - Synaptic loss ✓
(Mark first ONE only) (1)
- 2.3.2 Motor ✓ neuron (1)
- 2.3.3 Myelin sheath ✓
 provides insulation ✓ to neurons/speeds up transmission of impulses (2)
- 2.3.4 - Loss of memory ✓
 - Confusion ✓
 - Poor judgment ✓
 - Trouble understanding visual images ✓
 - Difficulty with language ✓
 - Issues with social behavior ✓
(Mark first TWO only) (2)
- 2.3.5 C ✓ (1)
- 2.3.6 - Synapse allows for impulses to travel in one direction from one neuron to another ✓/prevents continuous stimulation of the neurons
 - (Synapse loss in the) cerebrum ✓ will lead to Alzheimer's symptoms. (2)
- 2.3.7 (a) Dendrites ✓ (1)
 (b) Axon ✓ (1)
(11)

2.4 2.4.1

Normal eye	Cataract eye
- lens is clear ✓	- lens is cloudy ✓
- Light refracted onto yellow spot of retina ✓/light rays converge	- Light refracted to many parts of the retina ✓/light rays scatter in many directions

Table **(T)**: Columns with headings ✓ (5)

2.4.2 Surgery ✓ (1)

- 2.4.3 - **Accommodation*** ✓ to near vision
 - Ciliary muscles contract ✓
 - suspensory ligaments slacken ✓
 - tension in lens decreases ✓
 - lens becomes more convex ✓
 - refractive power increases ✓
 - a clear image is focused on the retina ✓

Any 4 + 1 **compulsory mark*** (5)
(11)

- 2.5 2.5.1 (a) Type of underwear worn ✓/tightness of underwear (2)
 (b) Sperm count ✓
- 2.5.2 Use **more than 5** men ✓ (1)
- 2.5.3 - Testes are close to the body ✓
 - causes an increase in temperature ✓/above optimal/above 35 °C
 - sperm denatures ✓/not healthy
 - sperm count decreases ✓ (Any 3) (3)
- 2.5.4 - To get the baseline ✓/normal levels
 - These are used to compare ✓ with when tight-fitting underwear is used (2)
- 2.5.5 The amount of sperm produced/sperm count while the men wore the tight-fitting underwear ✓✓ (2)
(10)
[50]

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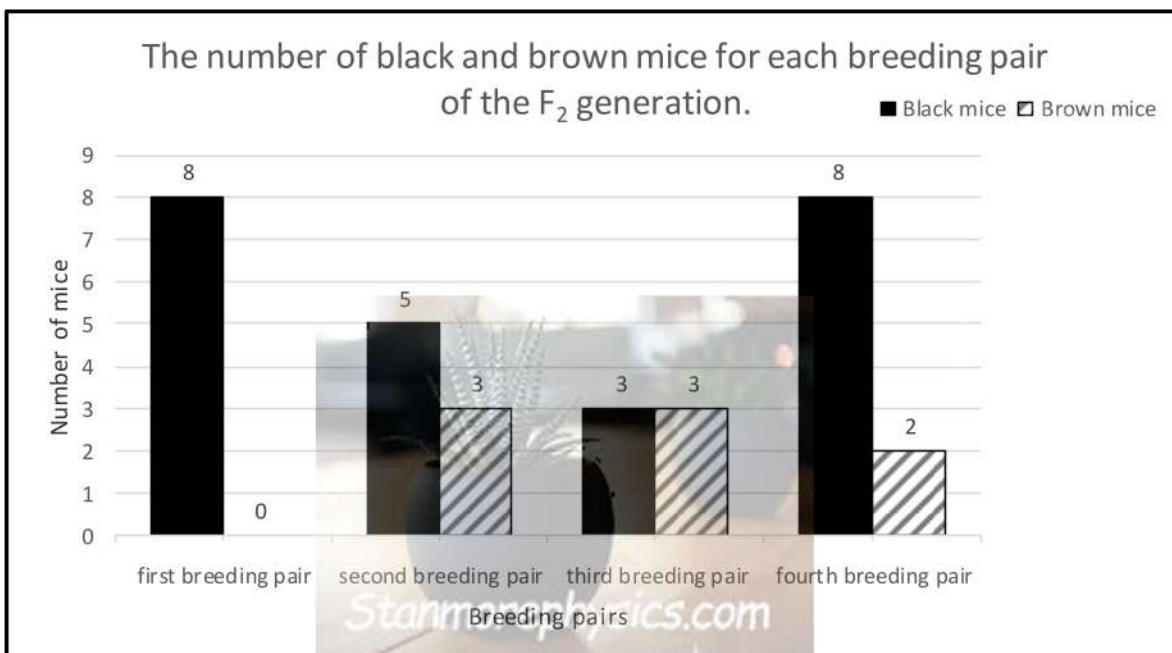
QUESTION 3

- 3.1 3.1.1 Protein synthesis ✓ (1)
- 3.1.2 A – Transcription ✓
 B – Translation ✓ (2)
- 3.1.3 - It is tRNA ✓
 - carries a **specific/required** amino acid ✓
 - to the ribosome ✓
 - when the anticodon on the tRNA matches the codon of the mRNA ✓ (Any 3) (3)
- 3.1.4 (a) Peptide ✓ bond (1)
 (b) E – Proline ✓ (2)
 F – Threonine ✓
- 3.1.5 CGG ✓✓/Cytosine, Guanine, Guanine (2)
- 3.1.6 (a) Gene ✓ mutation (1)
 (b) - Codon GCC (on the mRNA) changed to GCA ✓
 - Anticodon CGG (on tRNA) changed to CGU ✓
 - Both anticodons GCA and CGU code for Alanine ✓/the same amino acid
 - so the protein will not change. ✓/No effect

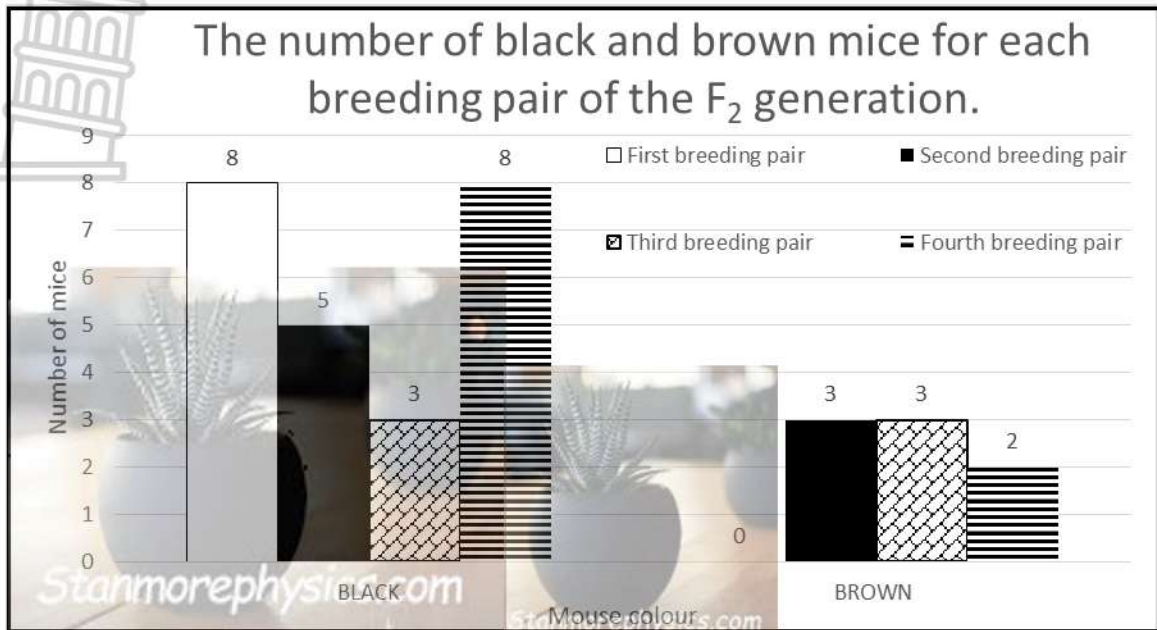
(4)
(16)

- 3.2 3.2.1 A – Homologous chromosomes ✓ (1)
 B – Spindle fibre ✓ (1)
- 3.2.2 (a) Metaphase 1 ✓ (1)
 (b) Homologous pairs of chromosomes are arranged at the equator ✓✓ (2)
- 3.2.3 Crossing over ✓*
 - Pairs of homologous chromosomes lie next to each other ✓
 - Chromatids from each homologous chromosomes overlap ✓
 - The point/s of crossing over are called chiasma ✓/chiasmata
 - Chromatid segments break off and are exchanged ✓/exchange of genetic material
 ANY 3 + 1* Compulsory (4)
- 3.2.4 Crossing over ensures increase in genetic variation ✓/diversity (in gametes/offspring) (1)
- 3.2.5 23 ✓ (1)
- 3.2.6 - Non-disjunction ✓ occurred/Chromosome pair/(chromatids) did not separate properly
 - During anaphase ✓ (2)
- 3.3 3.3.1 (8 + 5 + 3 + 8) : (0 + 3 + 3 + 2) ✓/24 : 8
 3 : 1 ✓ (2)
- 3.3.2 The parents (P₁) were black and brown mice ✓/homozygous with contrasting characteristics
 The offspring (F₁) generation were all black mice ✓ (2)

3.3.3



OR



Criteria	Mark allocation
Bar graph drawn (T)	1
Caption of graph (C) Includes number of mice, colour AND breeding pairs	1
Correct labels on X-axis and Y-axis (L)	1
Correct scale for Y-axis AND Equal spaces between bars and equal width of bars for X-axis (S)	1
Plotting(P): 1 to 7 coordinates are plotted correctly ONLY 8 correct coordinates are plotted	1 2

(6)
(10)

3.4 3.4.1 Alleles are different forms/versions of a gene ✓ (1)

3.4.2 Chromosomal ✓ mutations (1)

3.4.3 P₁ Phenotype: Wild type/grey striped x Wild type/grey striped ✓
 Genotype Gg x Gg ✓
 Meiosis
 G/Gametes G, g x G, g ✓

Fertilisation

F₁ Genotype GG Gg Gg gg ✓

Phenotype: 3 with Wild type/grey striped body: 1 ebony/dark body ✓

25%* ✓ chance of having an ebony body

P₁ and F₁ ✓

Meiosis and fertilisation ✓

*1 Compulsory + Any 5

P₁

Phenotype: Wild type/grey striped x Wild type/grey striped ✓

Genotype Gg x Gg ✓

Meiosis

Fertilisation

Gamete	G	g
G	GG	Gg
g	Gg	gg
1 mark for correct gametes ✓		
1 mark for correct genotypes ✓		

F₁ Phenotype: 3 with Wild type/grey striped body: 1 ebony/dark body ✓

25%* ✓ chance of having an ebony body

P₁ and F₁ ✓

Meiosis and fertilisation ✓

* 1 Compulsory + Any 5 (6)

3.4.4 Dihybrid ✓ cross (1)

3.4.5 Wild type/grey striped body colour ✓ and vestigial/short wing ✓ (2)
 (11)

[50]

TOTAL SECTION B: 100

TOTAL: 148

Additional notes to the marking of Gauteng June 2024

- 1.1. If the learner gave more than one answer, they will get no marks e.g. 1.1.2 C/D XX
- 1.2.2 Biotechnology is the “umbrella” term and has different forms including genetic engineering, DNA profiling, stem cells, cloning etc. We are only accepting the term and not the examples of it.
- 1.2.6 Accept “pupil reflex” even though it’s not in the examination guideline.
- 1.3.3/4 accept Both✓✓ A and B✓✓ A, B✓✓ but not A/B XX
- 1.5.1 Accept pupil widens✓ OR increases in diameter✓. No mark for pupil becomes bigger or larger✓ etc.
- 1.5.2 Has been removed and will not be marked, the total of the paper is 148.
- 1.5.3 MUST be cellular respiration (BOTH WORDS) no marks for respiration alone as it is often used to refer to breathing.
- 2.1.2 Endometrium will not be thick enough can be read into the first bullet.
- 2.2.4 Learners must specify developing/graafian/growing follicle, NO mark for Follicle alone. Learners can get the marks for hormone names alone. No mark for the origin without linking it to the correct hormone.
- 2.3.3. Accept Neurilemma✓
- Responsible for the repair of damaged neurons✓
- NOTE Knowledge of the Neurilemma is not required based on the examination guidelines.
- 2.4.3. Bullet 5, we can accept lens becomes more round✓
- NO mark for lens becomes round
- 2.5.1 Tight underwear X
- Use of loose fitting and tight fitting underwear✓
- 2.5.4 This is not the control. It is the starting point/baseline. A control is an experiment done in addition the actual experiment but with the independent variable is excluded.
- 3.1.3 Learner who discusses both transcription and translation in separate paragraphs, will lose all marks as the first paragraph will be marked. Where one long response is given, apply principle 3 and award marks for the correct portions.
- 3.1.6 a) Accept point mutation (Please note this is no longer in the examination guidelines)
- 3.2.2 b) Bivalents cannot be used in place of homologous chromosomes.

3.2.6 Second bullet: accept Anaphase ✓, Anaphase 2✓ or Anaphase 1 or/and 2 ✓ BUT NO MARK for anaphase 1

3.3.3 Mark each criterion independently of the others. No double penalization for the same error.

If a learner separated the bars (not as a double bar graph) they will not be penalized.

If bars of P1/F1 generation are included a maximum of 1 mark can be awarded for plotting.

3.4.5 Learner must mention the characteristic and its specific variant to get the mark.

NO mark for grey/ wild alone without body colour being mentioned. NO mark for vestigial/ short alone without wing being mentioned.

