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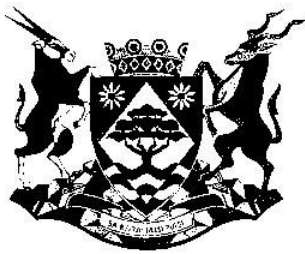
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DEPARTMENT OF EDUCATION
DEPARTEMENT VAN ONDERWYS
LEFAPHA LA THUTO
ISEBE LEZEMFUNDO

PROVINCIAL PREPARATORY EXAMINATION

GRADE 12

LIFE SCIENCES

PAPER 2

SEPTEMBER 2025

MARKING GUIDELINES

MARKS: 150

These marking guidelines consist of 14 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 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 provincial 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.
18. **Code-switching of official languages (terms and concepts)**
A single word or two that appear(s) in any official language other than the learner's 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 memorandum without the approval of the examiner and moderator.
20. **Official memoranda**
Only memoranda bearing the signatures of the provincial internal moderator and distributed by the Provincial Education Department via the districts must be used.



**SECTION A****QUESTION 1**

- | | | | | |
|-----|--------|--|----------|-------------|
| 1.1 | 1.1.1 | B ✓✓ | | |
| | 1.1.2 | A ✓✓ | | |
| | 1.1.3 | D ✓✓ | | |
| | 1.1.4 | D ✓✓ | | |
| | 1.1.5 | A ✓✓ | | |
| | 1.1.6 | C ✓✓ | | |
| | 1.1.7 | C ✓✓ | | |
| | 1.1.8 | A ✓✓ | | |
| | 1.1.9 | C ✓✓ | | |
| | 1.1.10 | B ✓✓ | (10 x 2) | (20) |
| 1.2 | 1.2.1 | Cytokinesis ✓ | | |
| | 1.2.2 | Genome ✓ | | |
| | 1.2.3 | Haemophilia ✓ | | |
| | 1.2.4 | Homologous structures ✓ | | |
| | 1.2.5 | Continuous ✓ variation | | |
| | 1.2.6 | Homologous chromosomes ✓ | | |
| | 1.2.7 | Theory ✓ | | |
| | 1.2.8 | Phenotype ✓ | | |
| | 1.2.9 | Spindle fibres ✓/spindle threads/spindle fibrils | | |
| | 1.2.10 | Allele ✓ (not multiple alleles) | (10 x 1) | (10) |
| 1.3 | 1.3.1 | A only ✓✓ | | |
| | 1.3.2 | Both A and B ✓✓ | | |
| | 1.3.3 | None ✓✓ | (3 x 2) | (6) |
| 1.4 | 1.4.1 | (a) B – Adenine ✓ | | (1) |
| | | (b) C – deoxyribose ✓ sugar | | (1) |
| | | (c) D – phosphate ✓ molecule | | (1) |
| | 1.4.2 | (weak) hydrogen ✓/H bond | | (1) |
| | 1.4.3 | Interphase ✓ | | (1) |
| | | | | (5) |





1.5	1.5.1	- Identify bodies ✓/victims of disasters/crime - Identify inherited disorders ✓/organ donor - Identify criminal suspect ✓/forensic evidence pointing to possible suspect/exonerate falsely accused individuals - Identify different pathogens ✓/strands of viruses and bacteria - Identify animal/plants species ✓/manage conservation - Trace family history ✓/discover family relationships /genealogy - Trace wildlife populations ✓ (Mark first TWO only)	(2)
	1.5.2	Genes ✓/alleles	(1)
	1.5.3	Mia ✓	(1)
			(4)
1.6	1.6.1	Gene ✓ mutation	(1)
	1.6.2	46 ✓ chromosomes/23 (chromosome) pairs	(1)
	1.6.3	Males ✓	(1)
	1.6.4	$X^K X^k$ ✓✓	(2)
			(5)
TOTAL SECTION A:			50





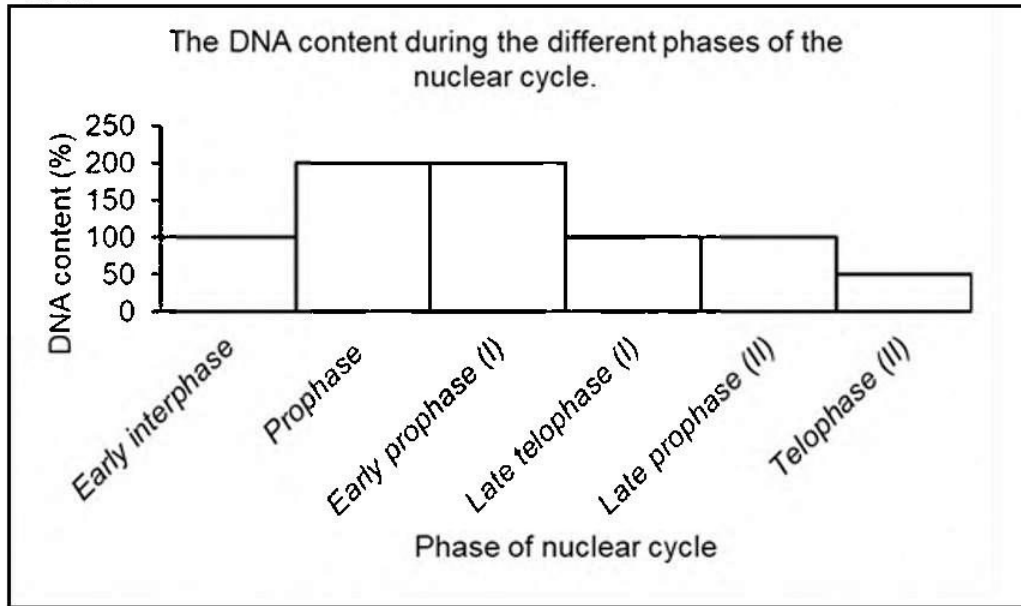
SECTION B

QUESTION 2

- 2.1 2.1.1 (a) **A** – nucleus ✓ (1)
 (b) **B** – mRNA ✓/messenger RNA (1)
 (c) **C** – ribosome ✓ (1)
 (d) **1** – transcription ✓ (1)
- 2.1.2 - Carries hereditary characteristics ✓
 - Controls the function of cells ✓
 - Controls the synthesis (making/producing) of proteins ✓/
 acts as a template for formation of mRNA
(Mark first ONE only) Any 1 (1)
- 2.1.3 (James) Watson, (Francis) Crick and (Maurice) Wilkens ✓✓ (2)
- 2.1.4 - Translation ✓*
 - Each tRNA carries a **specific** amino acid. ✓
 - When the anticodon on the tRNA ✓
 - **matches** the codon on the mRNA ✓
 - Then tRNA brings the required amino acid to the ribosome. ✓
 - Amino acids become attached to each other by peptide bonds ✓
 - to form the **required** protein. ✓
 *1 compulsory mark + Any 5 (6)
(13)
- 2.2 2.2.1 - Production of **haploid** gametes ✓/cells
 - The halving effect of meiosis overcomes the doubling effect of fertilisation ✓/maintaining a constant chromosome number
 - Contributes to/ensures genetic variation ✓
(Mark first THREE only) (3)



2.2.2

**Guideline for assessing the graph:**

SKILL	SYMBOL	MARK
Type of graph: histogram	T	1
Caption for graph: includes both variables - The relative amounts of DNA during mitosis and meiosis - The DNA content during the different phases of the nuclear cycle	C	1
Scale for Y-axis and width of bars on X-axis	S	1
Label for X-axis: Label and names of phases (accept if given in a key) Label for Y-axis: Label and unit	L	1
Drawing of bars	B	1: 1–5 correct bars 2: All bars correct

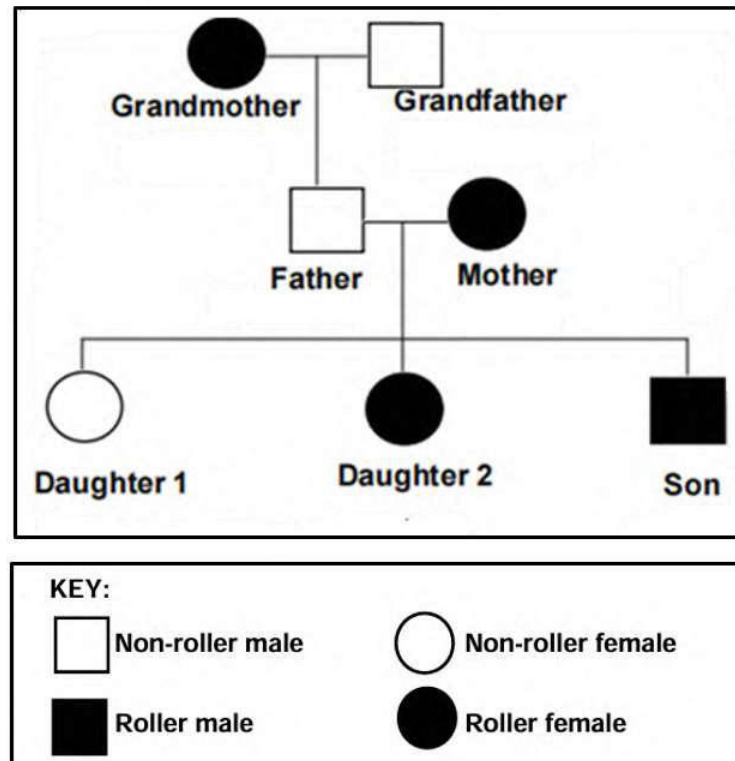
NOTE:

If the wrong type of graph is drawn:	- Marks will be lost for type (T)	
If axes are transposed:	-Marks will be lost for labeling (L)	
	-Marks will be lost for scale (S)	(6)

- 2.2.3 (a) - DNA replication will take place ✓
 - and the DNA content will double ✓/100 to 200
(not increase) (2)
- (b) - The number of chromosomes will be halved ✓/ 100 to 50
 chromosome pairs split (divide)
 - during anaphase I ✓ /anaphase of meiosis I (2)
(13)

- 2.3 2.3.1 (a) rr ✓ (1)
 (b) Rr ✓ (1)
- 2.3.2 50 ✓% (1)
- 2.3.3 Complete ✓ dominance (1)

2.3.4



Guideline for assessing the pedigree diagram:

SKILL	SYMBOL	MARK
Generation 1: Correct shapes and shading of connected grandparents	G	1
Generation 2: Correct shapes and shading of connected parents	P	1
Generation 3: Correct shapes and shading of connected children	C	1
Names of all individuals supplied OR No names given: Key included OR Correct caption	N	1

(4)
 (8)



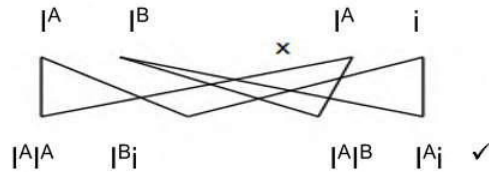
- 2.4 2.4.1 - An organism possesses two alleles ✓/'factors' which separate (segregate) so that
 - each gamete contains only one of these alleles ✓/'factors' (2)
- 2.4 2.4.2 Autosomes ✓ (1)
- 2.4.3 Male ✓ (1)
- 2.4.4 - The gonosomes ✓/chromosome pair number 23
 - are not identical ✓/XY
- OR**
- There is a Y ✓/smaller chromosome
 - at 23rd ✓ position/pair (2)
- 2.4.5 - During Anaphase ✓(1 or 2)
 - the chromosomes pair number 23 ✓/gonosomes
 - of the (female/male) parent does not separate ✓/there is non-disjunction in the person/parent
 - A **gamete** with XX ✓/XY-chromosome formed ✓.
 - During fertilisation the abnormal gamete/sperm/ovum fused with a normal gamete/sperm/ovum ✓
 - to form the **zygote** with XXY ✓/47 chromosomes Any 4 (4)
(10)



2.5 P₁ phenotype(Blood group) AB X (blood group) A ✓
Do not refer to heterozygous/homozygousgenotype
Meiosis $I^A I^B$ X $I^A i$ ✓

Gametes/G

Fertilisation

F₁ genotypeF₁ phenotype

(2/50%) blood group A	} ✓
(1/25%) blood group B	
(1/25%) blood group AB	

P₁ and F₁ ✓

Meiosis and fertilisation ✓

Any 6

OR

P₁ phenotype(Blood group) AB X (blood group) A ✓
Do not refer to heterozygous/homozygous

genotype

 $I^A I^B$ X $I^A i$ ✓

Meiosis

Fertilisation

Gametes	I^A	I^B
I^A	$I^A I^A$	$I^A I^B$
i	$I^A i$	$I^B i$

1 mark for correct gametes
1 mark for correct genotypes

F₁ phenotype

(2/50%) blood group A	} ✓
(1/25%) blood group B	
(1/25%) blood group AB	

P₁ and F₁ ✓

Meiosis and fertilisation ✓

Any 6 (6)
[50]

**QUESTION 3**

- 3.1 - The insulin producing gene is cut/isolated from the DNA of a human/healthy pancreas ✓ and
 - is inserted into the gene of bacterial DNA ✓/DNA of *E. coli*/plasmid
 - this is recombinant DNA ✓/this bacterium is genetically modified
 - and causes the bacterium/E. coli/culture to produce insulin ✓ (4)
- 3.2 3.2.1 *Homo sapiens* ✓ (1)
- 3.2.2 (Skull) **B** ✓ (1)
- 3.2.3 - Allows total awareness ✓ of the environment/sees further over high grass
 to sense danger ✓/look for food
- Enables hands to be free ✓
 to use implements ✓/carry objects/protect offspring
- Exposes a large surface area ✓
 for thermoregulation ✓/losing body heat to surroundings in hot conditions/reduces overheating/uses less water
- Small surface area exposed to the sun, ✓
 reducing overheating ✓/use less water
- Displays (male/female) sex organs ✓
 as part of courtship behaviour ✓
- (Mark first THREE only)** Any 3 x 2 (6)



3.2.4

(Organism) A/Gorilla	(Organism) B/ <i>Homo Sapiens</i> /Humans
Cranial ridge ✓ present	No cranial ridge ✓ present
Small(er) cranium ✓	Large(r) cranium ✓ (Not 'brain/skull')
Browridge well developed ✓	Browridge less developed ✓ (Not 'no browridge')
Large/well developed canines ✓ /fangs	Small/underdeveloped canines ✓ /no fangs
Jaws are prognathous ✓/Longer jaws/More protruding jaws	Jaws are non-prognathous ✓/ Shorter jaws/Less protruding jaws (Not 'less prognathous')
More pronounced zygomatic arches ✓	Less pronounced zygomatic arches ✓
Foramen magnum is more backward ✓	Foramen magnum is more forward ✓
Sloping face ✓/forehead	Flat face ✓/forehead

(Mark first THREE only)

1 ✓ Table + Any 3 x 2 (7)
(15)

- 3.3 3.3.1 - The change in characteristics of a species ✓
- over time ✓ (2)
- 3.3.2 - Squirrels with sparse hair ✓ resulted
in lower(cooler) body temperatures ✓
- Good digging claws ✓
enabled them to dig (make tunnels) in the deep/cool sand. ✓ (4)



- 3.3.3
- The original/ancestral **population** of the (ground) squirrels ✓
 - became separated by the canyon ✓*/Grand Canyon/deep eroded Colorado River
 - the population split into two ✓/divided into a north and south population
 - the squirrels stopped crossing the canyon because there was no shelter ✓/shade/temperature too high/desert habitat
 - there is no gene flow between the north and south population ✓/between the two squirrel populations
 - In the south side it was warmer, with less shade ✓/the squirrels were exposed to heat
 - in the north side it was cooler with more shade ✓/the squirrels were less exposed to heat/the exposure to heat differed in the north and south side
 - natural selection occurs independently in each of the two populations ✓
 - such that the individuals of the two populations **become different** ✓ from each other
 - genotypically and phenotypically ✓
 - even if the two populations were to mix again ✓
 - they will not be able to interbreed ✓
 - the two populations are the Abert and Kaibab squirrels ✓/are different species
- *1 compulsory mark + Any 7 (8)

- 3.3.4
- Breeding at different times of the year ✓
 - Species-specific courtship behavior ✓
 - Plant adaptation to different pollinators ✓
 - Infertile offspring ✓
- (Mark first TWO only) Any 2 (2)

- 3.4
- There is a great deal of variation amongst the offspring ✓
 - Some had favourable characteristics and some did not ✓
 - There is a change in the environmental conditions ✓
 - Whilst organisms with unfavourable characteristics, which made them less suited, died ✓
 - Whilst organisms with favourable characteristics made them more suited, survived ✓ and
 - Reproduce(d) ✓
 - the allele for favourable characteristic is passed on to their offspring ✓
 - The next generation will therefore have a higher proportion of individuals with the favourable characteristics ✓
- Any 7 (7)





3.5 3.5.1 (a) (Exposure to) DDT ✓/insecticide (1)

(b) Resistance of mosquitoes ✓ (1)

- 3.5.2 (a) - **Decide on** the duration ✓ of the investigation
 - **Decide on** the area ✓ to capture mosquitoes
 - **Decide on** the sample size ✓
 - **Decide on** date ✓/time of capturing mosquitoes
 - **Decide on** the concentration of DDT ✓ used
 - **Decide how** long the mosquitoes must be exposed to DDT ✓
 - **Decide how** to record the results ✓/on the form to record the results
 - **Decide on** type of mosquitoes ✓/species of mosquitoes
 - **Ask permission** ✓ (from authorities/land-owner) to conduct the investigation
 - **Select** apparatus ✓ to capture mosquitoes
 - **Train** research assistants ✓

(Mark first TWO only) Any 2 (2)

- (b) - **Same** time (1 hour per day) ✓ for the duration of the investigation
 - **Same** laboratory conditions ✓ for the full period of the investigation
 - **Same** dose (4%) of DDT ✓ for the full period of the investigation
 - **All** mosquitos must be healthy ✓ for the full period of the investigation

(Mark first TWO only) Any 2 (2)

- (c) - Mosquitoes developed a resistance to DDT ✓✓/
 resistance to DDT will increase over time

OR

- DDT is an not an effective insecticide to control the spread of mosiquitoes ✓✓

(2)

(8)

[50]

TOTAL SECTION B: 100

GRAND TOTAL: 150

