education

Department of Education
FREE STATE PROVINCE

GRADE 12

LIFE SCIENCES P2



JUNE 2025

TOTAL: 150

MARKING GUIDELINES

These marking guidelines consist of 10 pages.

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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 memo discussion meeting.

14. **If only the letter is asked for but only the name is given (and vice versa)**
    Do not credit.

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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.



SECTION A

QUESTION 1

1.1	1.1.1	B ✓✓		
	1.1.2	B ✓✓		
	1.1.3	D ✓✓		
	1.1.4	C ✓✓		
	1.1.5	C ✓✓		
	1.1.6	B ✓✓		
	1.1.7	B ✓✓		
	1.1.8	A ✓✓	(8x2)	**(16)**
1.2	1.2.1	Interphase ✓		
	1.2.2	Haemophilia✓		
	1.2.3	DNA profiling✓		
	1.2.4	Centriole / Centrosome✓		
	1.2.5	(Weak) hydrogen bonds✓		
	1.2.6	Homozygous✓		
	1.2.7	Ribose✓	(1x7)	**(7)**
1.3	1.3.1	A only✓✓		
	1.3.2	None✓✓		
	1.3.3	B only✓✓	(3 x 2)	**(6)**
1.4	1.4.1	a) Y✓		(1)
		b) X✓		(1)
	1.4.2	Double helix✓		(1)
	1.4.3	A C T G(✓✓)		(2)
	1.4.4	Mitochondria✓ Chloroplast✓		(2)
	1.4.5	Thymine✓ /(T)		(1)
	1.4.6	Four✓/4		(1) **(9)**

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1.5 1.5.1 Dihybrid (crossing) ✓ (1)

1.5.2 (a) BBhh✓✓ (2)
(b) bh✓/ bh bh bh bh (1)
(c) Brown hair colour and short hair✓✓ (2)
(6)

1.6 1.6.1 4 / Four✓ (1)

1.6.2 2/ Two✓ (1)

1.6.3
- They are the same/ similar size/length. ✓
- They have the same/ similar shape. ✓
- They have genes for the same characteristics. ✓
- They have alleles of a specific gene on the same locus. ✓
- They have centromeres in the same position. ✓ (2)

(Mark first TWO only) **(Any TWO)**

(1)

1.6.4 Centromere✓

(1)

1.6.5 Diploid cell✓ **(6)**

TOTAL SECTION A: (50)

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QUESTION 2

2.1.1 -It is the arrangement of the (complete set of an individual's) chromosomes✓
-According to the number and shape✓ of the chromosomes. (2)

2.1.2 Autosomes ✓ (1)

2.1.3 Female✓✓ (2)

2.1.4 - 3 chromosomes✓ / an extra chromosome
- at position number 21 ✓ (2)
(7)

2.2 - The factors/alleles that control a characteristic separate ✓
- during meiosis ✓
- so that only one factor/allele is present in each gamete ✓ **(3)**

2.3.1 Translation✓ (1)

2.3.2 Ribosome✓ (1)

2.3.3 a) Peptide Bond✓ (1)
b) tRNA✓ / transfer RNA (1)

2.3.4 3✓/three (1)

2.3.5 a) Tryptophan✓ (1)

b) ACC✓✓ (2)

c) 2✓ (1)

2.3.6
- The codon on the mRNA✓
- will change from UUA to UUG✓
- The anticodon on the tRNA will bring the same amino acid ✓/ Leucine to the ribosome
- The sequence of the amino acids would not change ✓
- Therefore, there will be no effect on the protein formed✓/ same protein will form (5)

(14)

2.4
- The DNA double helix unwinds✓ and
- (the double strand) unzips/weak hydrogen bonds break✓
- to form two separate strands✓
- One strand is used as a template✓
- To form mRNA✓
- Using free RNA nucleotides✓from the nucleoplasm
- The mRNA is complementary to the DNA ✓/A compliments U,G compliments C

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Any 6 **(6)**

2.5.1 Striped fur✓ (1)

2.5.2 - In Breeding pair 1✓
- both parents are spotted fur✓/none of the parents are striped fur
- but striped fur appears in the phenotype of the offspring✓

OR

- In cross 1✓
-The ratio spotted fur to stripe fur is 3:1✓
-The smaller portion represents the recessive alle striped fur ✓ (3)

2.5.3 A gene mutation is a **change in the sequence of nucleotides** in a gene/ DNA✓✓ (2)

2.5.4 Law of dominance✓ (1)

2.5.5 P1 Phenotype : Spotted fur x Spotted fur✓
Genotype Nn x Nn ✓

Meiosis
G/gametes N, n x N, n✓

Fertilization

F1 Genotype NN, Nn, Nn, nn ✓

Phenotype ratio: 3 Spotted : 1 striped *✓

P1 and F1✓
Meiosis and fertilization✓ ***Compulsory 1** + Any 5

OR

P1 Phenotype Spotted fur x Spotted fur ✓

Genotype Nn x Nn ✓

Meiosis

G/gametes N, n x N, n ✓

Fertilisation

Gametes	N	n
N	NN	Nn
n	Nn	nn

1 Mark for correct gametes
1 Mark for correct genotypes

F1 Genotype NN, Nn, Nn, nn
Phenotype 3 Spotted fur: 1 Striped fur ✓*

P1 and F1 ✓
Meiosis and fertilisation ✓ ***Compulsory 1** + Any 5

(6)
(13)

2.6.1 2✓ (1)

2.6.2 5 - X^RX^r✓✓ (2)

2.6.3 - Males have only one X chromosome✓/ XY sex chromosomes
- If this chromosome carries the recessive allele✓/ (X^r)
- the male will suffer from Lesch-Nyhan syndrome ✓
- Females have two X chromosomes✓/XX and
- will only suffer from Lesch-Nyhan syndrome when they carry two recessive alleles on both X chromosomes✓/($X^r X^r$)
- A dominant allele on one of the X-chromosomes will mask the effect✓

Any 4 (4)
(7)

Total Queston 2 [50]

QUESTION 3

3.1.1 Father **B** ✓ (1)

3.1.2 - All the DNA profile bars/bands of the children that do not match the mother✓, match the DNA profile bars/bands of Father B✓

OR

- All DNA profile bands of the mother and Father B✓
- match all the children's DNA profile bands✓ (2)

3.1.3 Child 1 and 2✓✓ (2)

3.1.4 - Blood groups cannot identify with certainty who is the father ✓/ blood groups can only eliminate men who are not the father

- Because many males have the same blood group. ✓

- Each person's DNA profile is unique. ✓ (3)

3.1.5 - To identify organisms/dead people from their remains✓
- To test for the presence of specific alleles✓for genetic conditions/Identification of genetic disorders
- To establish matching tissues for organ transplants✓
- Identification of suspects in a crime ✓
- Tracing missing persons ✓
- **(Mark first two only)** **Any 2** (2)

3.1.6
- Mark the samples clearly✓to ensure that the samples are not mixed up✓
- Wear a mask and gloves✓,DNA must not get contaminated✓
- Use new and clean/sterilized apparatus✓ to ensure no contamination from previous tests. ✓
- Check the access of persons/Only authorized persons may have access✓so that no one can tamper with the samples.

(Mark first ONE 0nly) **(Any 1 x 2)** (2)
(12)

3.2.1 Anaphase **1** (1)

3.2.2 - Chromosome of (homologous pair) is being pulled to the opposite poles ✓ (1)

3.2.3 a) Centriole✓ (1)
b) Spindle fiber✓ (1)

3.2.4 3✓/three (1)
(5)

3.3

Mitosis	Meiosis
Mitosis occurs in body cells✓	Meiosis occurs in sex cells✓
Both karyokinesis and cytokinesis occurs once.✓	Both karyokinesis and cytokinesis occurs twice.✓
Two daughter cells are formed.✓	Four daughter cell are formed.✓
Daughter cells are genetically identical to one another and to the parent cell✓	Daughter cells are genetically different from each other and from the parent cell✓
Chromosome number remains constant✓	Chromosome number is halved✓
Crossing over does not occur✓	Crossing over occurs✓

(7)

(Mark first THREE only) **(Any 3 X 2)** **✓ for TABLE**

3.4.1 What is the effect of temperature on the frequency of meiotic recombination in barley plants?✓✓ (2)

3.4.2 a) Temperature✓ (1)
b) Frequency of meiotic recombination✓ (1)

3.4.3 - Same amount of water✓
- Same light intensity✓
- Same barley plant variety✓
- Same precise method of counting ✓

(**Mark first THREE only**) **(Any 3)** (3)

3.4.4 - Genetic material is exchanged.✓ (1)

3.4.5 -The production of haploid gametes✓
- It maintains a constant chromosome number from one generation to the next.✓
- It increases genetic variation ✓ **(any 2)** (2)

(Mark first TWO only) **(10)**

3.5.1 Undifferentiated cells that can develop into any other type of cell✓✓ (2)

3.5.2 Mitosis✓ (1)

3.5.3 -It can help to replace and repair damaged cells ✓after an injury or infection
- Embryonic stem cells can differentiate into any cell type✓
- Some diseases and disorders can also be treated. ✓/ Leukemia and Parkinsons can be treated

(Mark first TWO only) **(Any 2)** (2)

3.5.4 Bone marrow✓/blood/heart/adipose tissue/brain/

(Mark first ONE only) **(Any 1)** (1)

(6)

3.6.1 - Blood groups/the gene for blood groups is controlled by three alleles✓/ I^A, I^B, i
- Each person can only inherit two alleles✓/One allele from each parent ✓
- The I^A and I^B allele are dominant ✓
- over the i allele ✓
- The combination I^Ai and I^AI^A produce blood group A✓
- The combination I^Bi and I^BI^B produces blood group B✓
- The combination I^AI^B produces blood group AB✓
- The combination ii produces blood group O✓ (6)

3.6.2
- The Mother is heterozygous for blood group A✓ / I^Ai
- Ther father is heterozygous for blood group B✓/ I^Bi
- The child is homozygous for blood group O✓ /ii
- And receive the recessive allele✓/i form each parent (4)

(10)

[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150

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