education
MPUMALANGA PROVINCE
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATION

GRADE 12

LIFE SCIENCES P2

SEPTEMBER 2022

MARKING GUIDELINES

MARKS: 150

These marking guidelines consist of 13 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 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 annotation 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 the answer provided it does not mean something else in Life Sciences or if it is out of context.

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13. **If common names are given in terminology**
Accept provided it is accepted at the provincial memo discussion meeting

14. **If only letter is asked for and only 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 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.

19. **Changes on the marking guideline**
No changes must be made to the marking guidelines without consulting the Provincial Internal Moderator.

SECTION A

QUESTION 1

1.1	1.1.1	B✓✓			
	1.1.2	D✓✓			
	1.1.3	C✓✓			
	1.1.4	B✓✓			
	1.1.5	D✓✓			
	1.1.6	B✓✓			
	1.1.7	B✓✓			
	1.1.8	C✓✓			
	1.1.9	C✓✓			
	1.1.10	A✓✓		(10 x 2)	**(20)**
1.2	1.2.1	Nucleotides✓			
	1.2.2	Peptide✓bond			
	1.2.3	Centrioles✓			
	1.2.4	Gonosomes✓			
	1.2.5	DNA profile✓			
	1.2.6	Karyotype✓			
	1.2.7	Interphase✓			
	1.2.8	Hominidae✓			
	1.2.9	Genes✓			
	1.2.10	Variation✓		(10 x 1)	**(10)**
1.3	1.3.1	None✓✓			(2)
	1.3.2	B only✓✓			(2)
	1.3.3	None✓✓			(2)
	1.3.4	Both A and B✓✓			(2)
				(4 x 2)	**(8)**
1.4	1.4.1	(a) - A✓ and C✓			(2)
		(b) - B✓			(1)
	1.4.2	A✓			(1)
	1.4.3	- Small gaps between the teeth✓/diastema - U-shaped palate✓ **(Mark first ONE only)**	Any 1		(1)
	1.4.4	C → A →B✓✓			(2)
					(7)

1.5	1.5.1	Cloning✓	(1)
	1.5.2	(a) - Mitosis✓	(1)
		(b) - Meiosis✓	(1)
	1.5.3	(a) - 38✓	(1)
		(b) - 38✓	(1)
			(5)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 2.1.1 (a) - Amino acid✓ (1)
(b) - tRNA✓ (1)

2.1.2 (a) - GUA✓✓ (2)
(b) - GTA✓✓ (2)

2.1.3 - DNA provides the code for a particular protein✓
- One strand is used as a template✓ to form the molecule **W/**mRNA (2)

2.1.4 Translation✓*
- Each t-RNA carries a specific amino acid✓
- according to its anticodon✓
- The anticodon attaches to the complementary codon✓
- on mRNA✓
- Then t-RNA brings the required amino acid to the ribosome✓
- arranging the amino acids in a specific sequence.✓
- Amino acids become attached by peptide bonds✓
- to form the required protein.✓

1 Compulsory* + any 6 (7)
(15)

2.2.1 Metaphase I✓ (1)

2.2.2 - Chromosomes align in pairs at the equator✓/ homologous chromosomes align in pairs at the equator of the cell (1)

2.2.3 Cell membrane✓ (1)

2.2.4 - Forms spindle fibres✓
- Attaches spindle fibres to centromere✓ (1)

2.2.5 Ovary✓/ovule (1)

2.2.6 (a) 3✓ (1)

2.2.7 - Same size✓/length/height
- Same shape✓
- Same position of centromeres✓
- Same position of genes✓/alleles
- Genes coding for the same characteristics✓
(Mark first THREE only) Any 3 (3)

2.2.8 - Exchange of genetic material✓
- introduces variation✓

- Random arrangement of chromosomes✓
- to cause genetic variation✓

- Reduction of chromosome number to haploid✓
- to keep the chromosome number constant from generation to generation✓

- Forms four haploid cells✓
- which function as gametes✓
(Mark first TWO only) (Any 2 x 2) (4)
(13)

2.3 2.3.1 Eyebrows not connected✓ (1)

2.3.2
- Parents **A** and **B** or **C** and **D** produce children with connected eyebrows✓
- and not connected eyebrows✓
- Only parents both carrying the dominant allele can
- produce offspring with both phenotypes✓

OR

- **A** and **B** or **C** and **D** have eyebrows that are not connected, produce a child with eyebrows which are connected✓
- then the allele for connected eyebrows was present in both parents✓,
- but masked✓, so eyebrows that are connected is recessive.

Any 2 (2)

2.3.3 (a) 4/FOUR✓ (1)

(b) 4/FOUR✓ (1)

2.3.4 [4/7 x 100]✓ = 57,14✓% (2)

2.3.6 In a heterozygous condition the dominant allele expresses itself in the phenotype✓, masking the effect of the recessive allele✓

OR

When two individuals with pure breeding contrasting characteristics are crossed ✓the offspring will display the dominant characteristic✓ (2)
(9)

2.4 2.4.1 One gene✓ (1)

2.4.2 (a) AB✓ (1)

(b) - In the other blood groups, the phenotypes show only one of the genes in the genotype✓, because the one dominates the other.

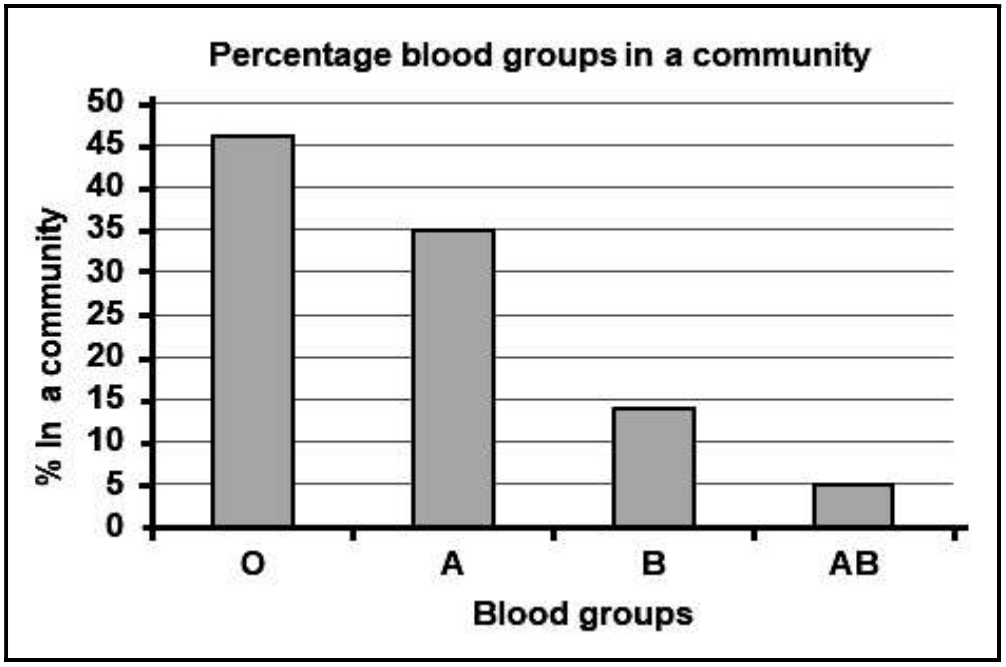
OR

- In this blood group the alleles are co-dominant✓ (1)

2.4.3 I^AI^A✓
I^Ai✓ (2)

2.4.4 Blood groups are controlled by three alleles✓ I^A, I^B and i which, when in combination, provide four phenotypes ✓(A, AB, B, O). (2)

2.4.5



Criteria	Mark Allocation	Mark
Correct type of graph **(T)**	Bar graph drawn	1
Caption for graph (**C**)	Both variables included	1
Axes labels **(L)**	X- and Y-axis correctly labelled with units	1
Scale for X-and Y-axis**(S)**	-Equal space between bars and width of bars for X-axis and -Correct scale for Y-axis	1
Plotting of bars **(P)**	-1 to 3 bars plotted correctly -All 4 bars plotted correctly	1 2

(6)

NOTE:

- If the wrong type of graph is drawn:

  Marks will be lost for 'correct type of graph'
- and if a line graph is drawn marks for plotting of bars will be lost
- If axes are transposed: marks will be lost for labelling and scaling of X-axis and Y axis

(13)
[50]

QUESTION 3

3.1	3.1.1	Genetic traits✓	(1)
	3.1.2	These traits are inherited✓ and not influenced by age✓	(2)
	3.1.3	- Increase the number of learners✓ - Repeat the investigation✓ **(Mark first ONE only)**	(1)
	3.1.4	- Get permission from school and parents to do the investigation✓ - Decide on venue✓where data will be collected - Day/time when data will be collected✓ - Make sure that a random distribution of boys and girls are monitored✓ - Plan how the data will be collected and recorded✓ **(Mark first ONE only)** Any 1	(1)
	3.1.5	Reject✓	(1)
	3.1.6	More learners displayed the recessive traits compared to the dominant traits✓✓	(2) **(8)**

3.2 3.2.1 - The allele for the trait is carried on the X-chromosome✓
- Males only have one X-chromosome✓
- A male therefore only needs one recessive allele✓to have haemophilia
- A female must have two recessive alleles to have haemophilia✓ (3)

3.2 3.2.2 P_1 Phenotype Man with haemophilia x Heterozygous women✓
Genotype X^hY x X^HX^h✓

Meiosis
G/Gametes X^h , Y x X^H , X^h✓



Fertilisation
F_1 Genotype $X^H X^h$, $X^h X^h$, X^HY, $X^h Y$ ✓*
Phenotype 25% boys without haemophilia: 25% boys with haemophilia
25% girls with haemophilia: 25% girls which are carriers✓
P_1 and F_1✓
Meiosis and fertilisation✓ ***1 compulsory + Any 5**

OR

P_1 Phenotype Haemophilia x Carrier✓
Genotype X^hY x X^HX^h✓

Meiosis

Fertilisation

Gametes	X^h	Y
X^H	$X^H X^h$	X^HY
X^h	$X^h X^h$	$X^h Y$
1 mark for correct gametes 1 mark for correct genotypes*		

F_1 Genotype $X^H X^h$, $X^h X^h$, X^HY, $X^h Y$ ✓*
Phenotype 25% boys without haemophilia: 25% boys with haemophilia
25% girls with haemophilia: 25% girls which are carriers✓ (6)

P_1 and F_1✓
Meiosis and fertilisation✓ ***1 compulsory + Any 5**

(9)

3.3 3.3.1 - There was an increase in the percentage of resistant insects✓ from 0,15% (in 1995) to 99,10%✓ (in 1998) (2)

3.3.2 - There is variation in the insect population✓
- Some were resistant and some were not✓
- When the insecticide was first used, it killed off a large number of non-resistant insects✓
- Some insects were resistant to the insecticide and survived✓
- Those that survived were able to reproduce✓
- Thereby passing on the allele (gene) for resistance to offspring✓
- Continued use of the insecticide had little effect on the resistant insects✓
- Therefor the resistant insects increased ✓and the
- non-resistant insects decreased ✓ Any 7 (7)
(9)

3.4 3.4.1 Speciation✓ (1)

3.4.2
- The original population of salamander became separated✓into two
- **by the central valley***✓/geographical barrier (Compulsory)
- No gene flow occurred between the populations✓
- Each population was exposed to different environmental
- conditions/selection pressure✓
- Natural selection occurred independently in each population✓
- The individuals in each population became different✓
- genotypically and phenotypically✓ from each other
- Even if the two populations were to mix✓
- they would be unable to interbreed/ reproduce✓
- resulting in the formation of species **B**.✓

1 compulsory* + Any 5 (6)

3.4.3 In punctuated equilibrium:

- Evolution will involve long periods of time ✓ where species do not change /very little change occurs✓
- and this will alternate with short periods of time where rapid changes✓occur
- New species are formed in a short period of time✓
- supported by the absence of transitional fossils✓ Any 4 (4)

(11)

3.5	3.5.1	- Freely rotating arms ✓ - Long upper arms✓ - Elbow joints which allow rotation of forearms✓ - Rotating hands✓ - Flat nails instead of claws✓ - Opposable thumbs✓ **(Mark first THREE only)**	Any 3	(3)
	3.5.2	- Little Foot✓ - Taung child✓ / *Australopithecus africanus* - Mrs Ples✓/ *Australopithecus africanus* - Karabo✓ / *Australopithecus sediba* **(Mark first TWO only)**	Any 2	(2)
	3.5.3	- It became wide and short✓ - and have a bowl shape✓ - to hold the weight✓ of the body - making upright walking possible✓		(4)
	3.5.4	- Mitochondrial DNA (mtDNA) ✓ - is only inherited through the maternal line✓ - analysis of the mutation on the mtDNA✓ - shows that the oldest female ancestor was located in Africa✓ - and that all humans descended from her/mitochondrial Eve✓ - the Y chromosome shows the paternal line ✓	Any 4	(4) **(13)**
			TOTAL SECTION B	**50**
			GRAND TOTAL:	**150**

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