



**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.**

## Marking Guidelines

**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.



## Marking Guidelines

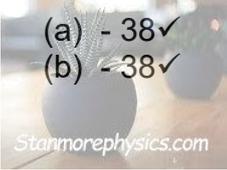
13. **If common names are given in terminology**  
Accept provided it is accepted at the provincial memo discussion meeting
14. **If only letter is asked for and only name is given (and vice versa)**  
Do not credit.
15. **If units are not given in measurements**  
Candidates will lose marks. Memorandum 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.

## Marking Guidelines

**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)	<b>(20)</b>
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)	<b>(10)</b>
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)	<b>(8)</b>
1.4	1.4.1	(a) - A✓ and C✓ (b) - B✓		(2) (1)
	1.4.2	A✓		(1)
	1.4.3	- Small gaps between the teeth✓/diastema - U-shaped palate✓ <b>(Mark first ONE only)</b>	Any 1	(1)
	1.4.4	C → A → B✓✓		(2) <b>(7)</b>

## Marking Guidelines

1.5	1.5.1	Cloning✓	(1)
	1.5.2	(a) - Mitosis✓ (b) - Meiosis✓	(1) (1)
	1.5.3	(a) - 38✓ (b) - 38✓ 	(1) (1) <b>(5)</b>
<b>TOTAL SECTION A:</b>			<b>50</b>

## Marking Guidelines

**SECTION B****QUESTION 2**

2.1	2.1.1	(a) - Amino acid✓ (b) - tRNA✓		(1)
				(1)
	2.1.2	(a) - GUA✓✓ (b) - GTA✓✓		(2)
				(2)
	2.1.3	- DNA provides the code for a particular protein✓ - One strand is used as a template✓ to form the molecule <b>W</b> /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.✓		
			<b>1 Compulsory* + any 6</b>	(7)
				<b>(15)</b>

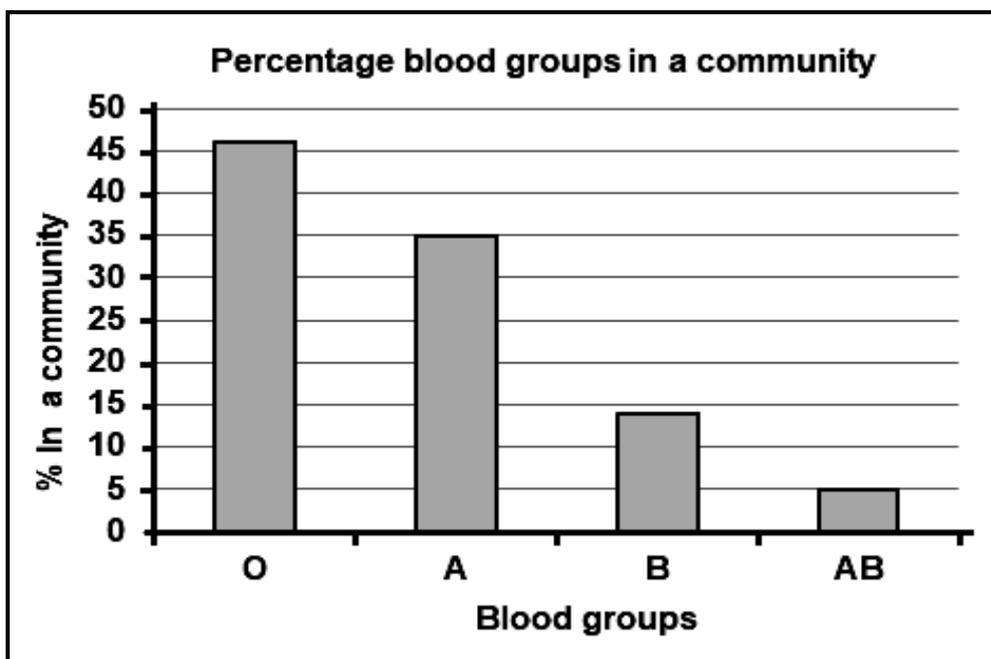
## Marking Guidelines

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✓ <b>(Mark first THREE only)</b>	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✓ <b>(Mark first TWO only)</b>	(Any 2 x 2)	(4) <b>(13)</b>

## Marking Guidelines

- 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  $[4/7 \times 100]✓ = 57,14✓\%$  (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  $I^A I^A$ ✓ (2)
- $I^A i$ ✓
- 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	1
	-All 4 bars plotted correctly	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]

## Marking Guidelines

**QUESTION 3**

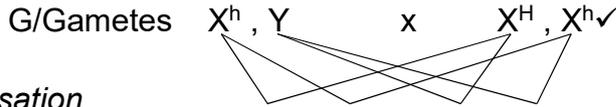
- 3.1 3.1.1 Genetic traits✓ (1)
- 3.1.2 These traits are inherited✓ and not influenced by age✓ (2)
- 3.1.3 - Increase the number of learners✓  
- Repeat the investigation✓  
**(Mark first ONE only)** (1)
- 3.1.4 - Get permission from school and parents to do the investigation✓  
- Decide on venue✓ where 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)**

Marking Guidelines

- 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<sub>1</sub> Phenotype Man with haemophilia x Heterozygous women✓  
 Genotype X<sup>h</sup>Y x X<sup>H</sup>X<sup>h</sup>✓

Meiosis



Fertilisation

F<sub>1</sub> Genotype X<sup>H</sup>X<sup>h</sup>, X<sup>h</sup>X<sup>h</sup>, X<sup>H</sup>Y, X<sup>h</sup>Y ✓\*  
 Phenotype 25% boys without haemophilia: 25% boys with haemophilia  
 25% girls with haemophilia: 25% girls which are carriers✓

P<sub>1</sub> and F<sub>1</sub>✓

Meiosis and fertilisation✓

\*1 compulsory + Any 5

OR

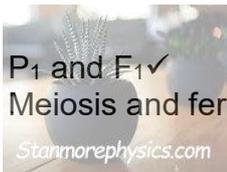
P<sub>1</sub> Phenotype Haemophilia x Carrier✓  
 Genotype X<sup>h</sup>Y x X<sup>H</sup>X<sup>h</sup>✓

Meiosis

Gametes	X <sup>h</sup>	Y
X <sup>H</sup>	X <sup>H</sup> X <sup>h</sup>	X <sup>H</sup> Y
X <sup>h</sup>	X <sup>h</sup> X <sup>h</sup>	X <sup>h</sup> Y
1 mark for correct gametes 1 mark for correct genotypes*		

Fertilisation

F<sub>1</sub> Genotype X<sup>H</sup>X<sup>h</sup>, X<sup>h</sup>X<sup>h</sup>, X<sup>H</sup>Y, X<sup>h</sup>Y ✓\*  
 Phenotype 25% boys without haemophilia: 25% boys with haemophilia (6)  
 25% girls with haemophilia: 25% girls which are carriers✓



P<sub>1</sub> and F<sub>1</sub>✓  
 Meiosis and fertilisation✓

\*1 compulsory + Any 5

(9)

## Marking Guidelines

- 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)



## Marking Guidelines

- 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)**

## Marking Guidelines

3.5	3.5.1	<ul style="list-style-type: none"> <li>- Freely rotating arms ✓</li> <li>- Long upper arms ✓</li> <li>- Elbow joints which allow rotation of forearms ✓</li> <li>- Rotating hands ✓</li> <li>- Flat nails instead of claws ✓</li> <li>- Opposable thumbs ✓</li> </ul> <p><b>(Mark first THREE only)</b></p>	Any 3	(3)
	3.5.2	<ul style="list-style-type: none"> <li>- Little Foot ✓</li> <li>- Taung child ✓ / <i>Australopithecus africanus</i></li> <li>- Mrs Ples ✓ / <i>Australopithecus africanus</i></li> <li>- Karabo ✓ / <i>Australopithecus sediba</i></li> </ul> <p><b>(Mark first TWO only)</b></p>	Any 2	(2)
	3.5.3	<ul style="list-style-type: none"> <li>- It became wide and short ✓</li> <li>- and have a bowl shape ✓</li> <li>- to hold the weight ✓ of the body</li> <li>- making upright walking possible ✓</li> </ul>		(4)
	3.5.4	<ul style="list-style-type: none"> <li>- Mitochondrial DNA (mtDNA) ✓</li> <li>- is only inherited through the maternal line ✓</li> <li>- analysis of the mutation on the mtDNA ✓</li> <li>- shows that the oldest female ancestor was located in Africa ✓</li> <li>- and that all humans descended from her/mitochondrial Eve ✓</li> <li>- the Y chromosome shows the paternal line ✓</li> </ul>	Any 4	(4) <b>(13)</b>
			<b>TOTAL SECTION B</b>	<b>50</b>
			<b>GRAND TOTAL:</b>	<b>150</b>