



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) | (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✓ (b) - B✓ | | (2) (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) |

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) (5) |
| TOTAL SECTION A: | | | 50 |

Marking Guidelines

SECTION B**QUESTION 2**

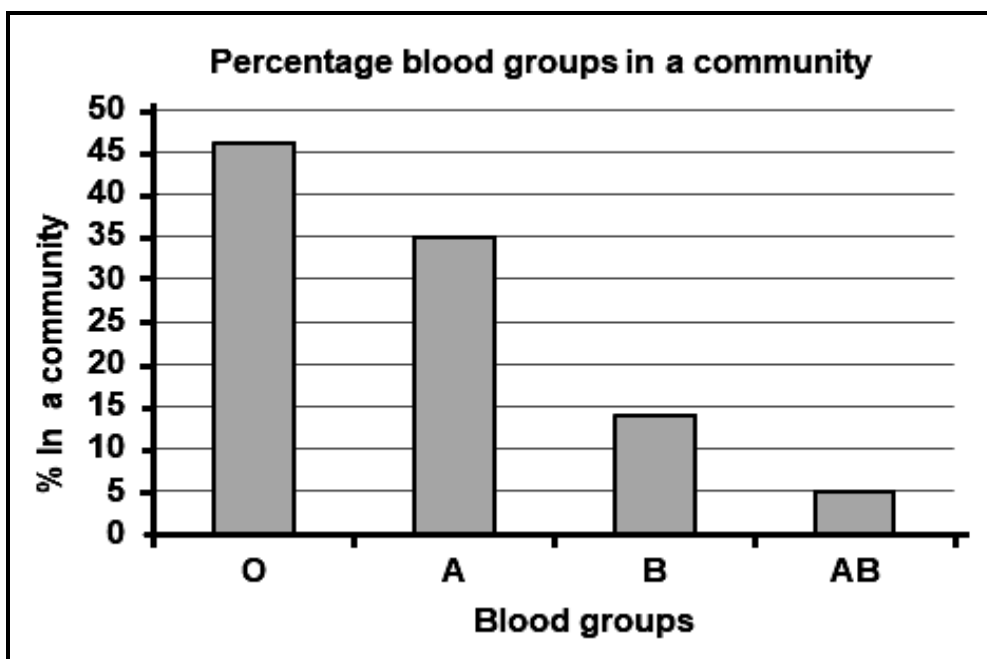
| | | | | |
|------------------------------|-------|--|---|-------------|
| 2.1 | 2.1.1 | (a) - Amino acid✓ (b) - tRNA✓ |  | (1) |
| | | | | (1) |
| | 2.1.2 | (a) - GUA✓✓ (b) - GTA✓✓ | | (2) |
| | | | | (2) |
| | 2.1.3 | - DNA provides the code for a particular protein✓ - One strand is used as a template✓ to form the molecule 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) |

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✓ (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 $[4/7 \times 100]✓ = 57,14✓\%$ (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 $I^A I^A$ ✓
 $I^A i$ ✓ (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]

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 P₁ Phenotype Man with haemophilia x Heterozygous women✓
 Genotype X^hY x X^HX^h✓

Meiosis



Fertilisation

F₁ Genotype X^H X^h, X^h X^h, X^HY, X^hY ✓*
 Phenotype 25% boys without haemophilia: 25% boys with haemophilia
 25% girls with haemophilia: 25% girls which are carriers✓

P₁ and F₁✓

Meiosis and fertilisation✓

***1 compulsory + Any 5**

OR

P₁ Phenotype Haemophilia x Carrier✓
 Genotype X^hY x X^HX^h✓

Meiosis

| Gametes | X ^h | Y |
|----------------|-------------------------------|------------------|
| X ^H | X ^H X ^h | X ^H Y |
| X ^h | X ^h X ^h | X ^h Y |

Fertilisation

1 mark for correct gametes
 1 mark for correct genotypes*

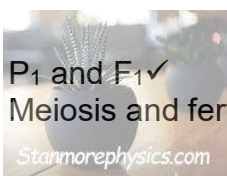
F₁ Genotype X^H X^h, X^h X^h, X^HY, X^hY ✓*
 Phenotype 25% boys without haemophilia: 25% boys with haemophilia (6)
 25% girls with haemophilia: 25% girls which are carriers✓

P₁ and F₁✓

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✓
- Therefore 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)**

| | | | | |
|------------------------|-------|--|-------|-------------|
| 3.5 | 3.5.1 | <ul style="list-style-type: none"> - Freely rotating arms ✓ - Long upper arms ✓ - Elbow joints which allow rotation of forearms ✓ - Rotating hands ✓ - Flat nails instead of claws ✓ - Opposable thumbs ✓ <p>(Mark first THREE only)</p> | Any 3 | (3) |
| | 3.5.2 | <ul style="list-style-type: none"> - Little Foot ✓ - Taung child ✓ / <i>Australopithecus africanus</i> - Mrs Ples ✓ / <i>Australopithecus africanus</i> - Karabo ✓ / <i>Australopithecus sediba</i> <p>(Mark first TWO only)</p> | Any 2 | (2) |
| | 3.5.3 | <ul style="list-style-type: none"> - 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 | <ul style="list-style-type: none"> - 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 |