KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

FINAL

NATIONAL
SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P2

PREPARATORY EXAMINATION

SEPTEMBER 2023

MARKING GUIDELINES

MARKS: 150

This marking guidelines consists of 10 pages.

PRINCIPLES RELATED TO MARKING LIFE SCIENCES SEPTEMBER 2022

1. **If more information than marks allocated is given**
    Stop marking when maximum marks are 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 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 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 is incorrect, do not credit. If sequence and links becomes correct again, resume credit.

9. **Non-recognised abbreviations**
    Accept if first defined in answer. If not defined, do not credit the unrecognized 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 recognizable accept provided it does not mean something else in Life Sciences or if it is out of context.

13. **If common names given in terminology**
    Accept provided it was accepted at the National memo discussion meeting.

14. **If only letter is asked for and only name is given (and vice versa)**
    No 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.

SECTION A

QUESTION 1

1.1   1.1.1   B✓✓
       1.1.2   D✓✓
       1.1.3   B✓✓
       1.1.4   C✓✓
       1.1.5   D✓✓
       1.1.6   C✓✓
       1.1.7   B✓✓
       1.1.8   B✓✓
       1.1.9   D✓✓
       1.1.10   C✓✓

                                                    (10 x 2)   **(20)**

1.2   1.2.1   Stem✓cells
       1.2.2   Chiasmata✓
       1.2.3   Cloning✓
       1.2.4   Thymine✓
       1.2.5   Colour blindness✓
       1.2.6   Mutation✓
       1.2.7   Artificial selection✓/Selective breeding
       1.2.8   Cultural✓evidence

                                                    (8 x 1)   **(8)**

1.3   1.3.1   Both A and B✓✓
       1.3.2   None✓✓
       1.3.3   B only✓✓

                                                    (3 x 2)   **(6)**

1.4   1.4.1   (a) DNA replication✓   (1)
                (b) DNA✓ molecule   (1)
                (c) Double helix✓   (1)

       1.4.2   (a) Hydrogen✓bond   (1)
                (b) Deoxyribose sugar✓   (1)
                (c) Nucleotide✓   (1)

       1.4.3   Chloroplast✓   (1)
                                                                     (7)

1.5   1.5.1   (a) B✓   (1)
                (b) A✓   (1)

       1.5.2   (a) Homo sapiens   (1)
                (b) Chimpanzee   (1)

       1.5.3   - Pelvis A is short✓ whereas B is long✓
                - Pelvis A is wide✓ whereas B is narrow✓   (4)
                (**Mark the first TWO only**)

1.5.4   Supports upper body weight✓   (1)
          (**Mark the first ONE only**)   **(9)**

                                                              TOTAL SECTION A: **50**

SECTION B

QUESTION 2

2.1   2.1.1   (a)   Metaphase II✓   (1)
                   (b)   Chromosome✓   (1)

         2.1.2   Gamete✓/sex cell   (1)

         2.1.3   6✓/six   (1)

         2.1.4   (a)   Non-disjunction✓   (1)
                   (b)   Down syndrome✓   (1)

         2.1.5   - Cell in diagram II has three chromosomes✓
                   - Cell would have 23 chromosomes✓   (2)
                                                                                               (8)

2.2   2.2.1   (a)   Nucleus✓   (1)
                   (b)   Amino acid✓   (1)

         2.2.2   TAA✓   (1)

         2.2.3   - Transcription✓*
                   - mRNA copies coded message from DNA✓
                   - which moves to the ribosomes✓
                   - so that amino acids can be arranged in a specific sequence✓
                   - for the formation of a specific protein✓
                                                      Compulsory 1*+any 2   (3)
         2.2.4   - Picks up specific amino acids✓
                   - and bring them to the ribosomes✓
                   - has specific anticodons✓ that are
                   - complementary to the (mRNA) codons✓   Any   (3)

         2.2.5   (a)   Serine✓   (1)

                   (b)   - The anticodon will be UAG✓
                         - instead of UAA✓
                         - Amino acid isoleucine will not change✓
                         - resulting in the same protein✓   Any   (3)
                                                                                               (13)

2.3   2.3.1   Pedigree✓ diagram   (1)

         2.3.2   2✓   (1)

         2.3.3   DMD male✓   (1)

2.3.4   (a) X^DX^d✓   (1)

(b)   - X^DX^D✓
      - X^DX^d✓   (2)

2.3.5   - Individual A is unaffected✓
        - caused by dominant allele on X chromosome✓/X^D
        - Offspring C inherits Y chromosome from individual B✓/father
        - and X^d from individual A✓/mother
                              OR
        - Individual A has an offspring C who is affected
        - Therefore, receiving a recessive allele/X^d from individual A
        - individual A must have a dominant allele as well
        - hence she is unaffected   Any   (3)

2.3.6 $\dfrac{1}{2}$ ⎤✓ x 100✓ = 50%✓   (3)

2.3.7   - DMD is caused by a recessive allele on the X chromosome✓/X^d
        - Sons inherit the Y chromosome from their father✓   (2)
                                                                              (14)

2.4   **P₁**   Phenotype   Unaffected   x   Unaffected✓*

                    Genotype   Rr   x   Rr✓*
Meiosis
                    Gametes   R,   r   x   R,   r✓
Fertilisation

F₁   Genotype   RR, Rr   Rr,   rr✓

              Phenotype   3 unaffected and affected✓

P₁ and F₁✓
Meiosis and fertilisation✓

                                          Compulsory mark 2* + Any 4

                              OR
P₁   Phenotype   Unaffected   x   Unaffected✓*

              Genotype   Rr   x   Rr✓*

Meiosis

Fertilisation

F₁

Gametes	R	r
R	RR	Rr
r	Rr	rr

1 mark for correct gametes
1 mark for correct genotypes

              Phenotype   3 unaffected and affected✓
P₁ and F₁✓
Meiosis and fertilisation✓   **Compulsory mark** 2* + Any 4   **(6)**

2.5   2.5.1   (a) I^Bi✓   (1)
               (b)   O✓   (1)

       2.5.2   Complete✓ dominance   (1)

       2.5.3   Man 2✓   (1)

       2.5.4   - Man 1 or man 3 could be the father of Sipho✓
               - since both man may have recessive allele✓/i / I^Ai or ii✓
               - The mother must have genotype I^Bi✓ since she is blood type B
               - Sipho would have inherited the recessive allele/i from both parents✓
               - and he would have the genotype ii✓   (5)
                                                                                                    (9)
                                                                                                    [50]

QUESTION 3

3.1   3.1.1   Dihybrid✓cross   (1)

       3.1.2   An allele that is masked/not shown in the phenotype when found in the
               heterozygous condition✓✓
                                          OR
               An allele that is expressed in the phenotype when found in the
               homozygous condition✓✓   (2)

       3.1.3   Two✓/2   (1)

       3.1.4   (a)   Black fur, prick-eared✓   (1)
               (b)   Bbee✓✓   (2)
               (c)   - bE✓   (1)
                      - be✓   (1)

       3.1.5   (a)   Offspring 2✓   (1)
               (b)   Offspring 1✓   (1)
                                                                                                    (11)

3.2   3.2.1   (a)   - Nausea✓
                      - Eye discomfort✓   (2)
                      (**Mark the first TWO only**)

               (b)   - Diarrhoea✓
                      - Stomach cramps✓
                      - Fever✓   Any   (2)
                      (**Mark the first TWO only**)

Life Sciences P2   September 2023
Grade 12 – **FINAL Marking guideline**

3.2.3   - Natural selection✓ occurs
      - There is variation✓/mutation in the population of bacteria
      - Some are resistant to the antibiotic ciprofloxacin, some are non-resistant✓
      - When ciprofloxacin is used✓
      - The bacteria that are non-resistant are killed✓ by the ciprofloxacin
      - Those that are resistant survive and reproduce✓
      - The characteristic for resistance to ciprofloxacin is passed on to the offspring✓
      - The next generation will have a higher proportion of ciprofloxacin resistant bacteria✓   Any   **(6)**
                                                  (10)

3.3   3.3.1   (a)   Percentage of mice killed by predators✓   (1)
              (b)   Fur colour✓   (1)

        3.3.2   It results in light brown fur that camouflage well against the sand✓ (1)
                 Mark the first ONE only

        3.3.3   Repeated the investigation for five years✓   (1)
                 Mark the first ONE only

        3.3.4   The light brown mice have lesser percentage killed by predators than dark brown mice✓✓
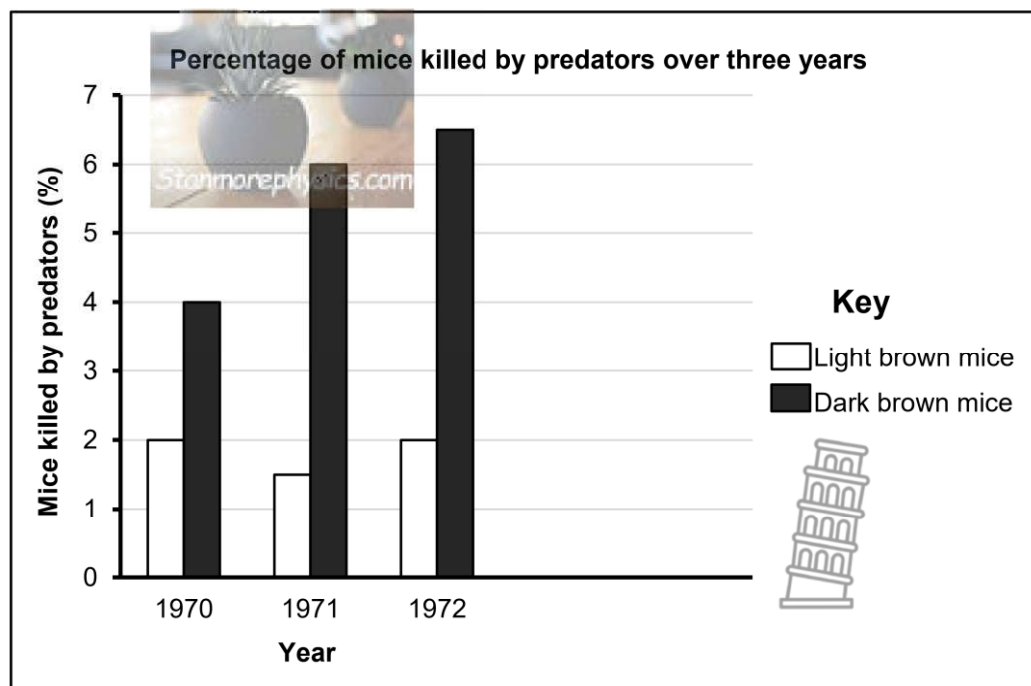   **OR**
                 The dark brown mice have higher percentage killed by predators than light brown mice✓✓   (2)
                 Mark the first ONE only

        3.3.5

Guideline for assessing the graph

CRITERIA	ELABORATION	MARK
Correct type of graph **(T)**	Bar graph drawn	1
Caption of graph **(C)**	Both variables included	1
Axes labels **(L)**	X- and Y-axes correctly labelled	1
Scale for X- and Y-axes **(S)**	- Equal space and width of bars for X-axes and - Correct scale for Y-axes	1
Plotting of co-ordinates **(P)**	1 to 5 co-ordinates plotted correctly	1
	Only first 3 years co-ordinates plotted correctly	2

(6)
(12)

3.4   3.4.1   'Out of Africa'✓ hypothesis   (1)

      3.4.2   (a)   - Homo erectus✓
                    - Homo sapiens✓   Any   (2)
                    Mark the first TWO only

              (b)   - Ardipithecus✓
                    - Australopithecus✓
                    - Homo habilis✓   (2)
                    Mark the first TWO only

      3.4.3   Hominidae✓   (1)

      3.4.4   Genetic✓ evidence   (1)
                                                                      (7)

3.5   3.5.1   It has characteristics common to both giraffes A and B✓
                              OR
              It has intermediate characteristics between giraffe A and B✓   (1)
              Mark the first ONE only

      3.5.2   - Ancestor of giraffes was having short neck✓
              - Environment change to have long trees✓
              - It stretched the neck to feed on top branches✓
              - The neck developed and became long✓
              - to feed on top branches✓
              - Giraffe passed on long neck to the offspring✓   Any   (4)
                                                                      (5)

3.6   3.6.1   Breeding at different times✓   (1)

      3.6.2   - Species-specific courtship behavior✓
              - Infertile offspring✓
              - Prevention of fertilisation✓   Any   (2)
              Mark the first TWO only

3.6.3   - If they were allowed to interbreed✓
         - and cannot produce fertile offspring✓
                    OR
         - Analysis of DNA✓
         - to check the matching sequence✓   Any   (2)
                                                                     (5)
                                                                     [50]

                                            TOTAL SECTION B: **100**

                                               GRAND TOTAL: **150**