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Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

LIFE SCIENCES P2

FEBRUARY/MARCH 2017

MARKING GUIDELINE

MARKS: 150

This memorandum consists of 12 pages.

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 national memo discussion meeting.

14. **If only the letter is asked for, but only the 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 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.

19. **Changes to the memorandum**
No changes must be made to the memoranda. The provincial internal moderator must be consulted, who in turn will consult with the national internal moderator (and the Umalusi moderators where necessary).

20. **Official memoranda**
Only memoranda bearing the signatures of the national internal moderator and the Umalusi moderators and distributed by the National Department of Basic Education via the provinces must be used.

SECTION A

QUESTION 1

1.1   1.1.1   B✓✓
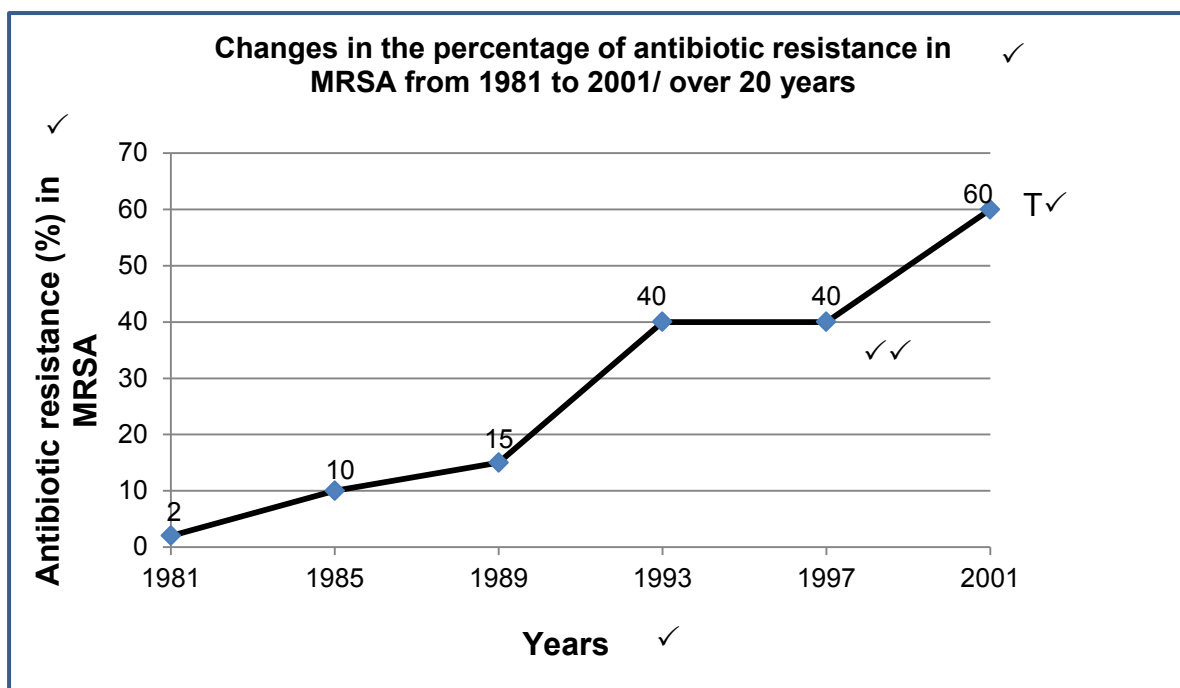   1.1.2   C✓✓
        1.1.3   B✓✓
        1.1.4   D✓✓
        1.1.5   C✓✓
        1.1.6   B✓✓
        1.1.7   A✓✓
        1.1.8   D✓✓   (8 x 2)   **(16)**

1.2   1.2.1   (Gene) mutation✓
        1.2.2   Theory✓
        1.2.3   Artificial selection✓/Selective breeding
        1.2.4   Ribose✓sugar
        1.2.5   Punctuated equilibrium✓
        1.2.6   Out of Africa✓hypothesis
        1.2.7   Fossils✓   (7 x 1)   **(7)**

1.3   1.3.1   A only✓✓
        1.3.2   Both A and B✓✓
        1.3.3   B only✓✓   (3 x 2)   **(6)**

1.4   1.4.1   (a) 25✓ mya (accept 24 to 25)   (1)

                  (b) 63✓ mya   (1)

        1.4.2   Old World monkeys✓ and apes✓
                  (MARK FIRST TWO ONLY)   (2)

        1.4.3   Lorises✓   (1)
                                                                                             (5)

1.5   1.5.1   23✓   (1)

        1.5.2   (a) Centromere✓   (1)

                  (b) Chiasma✓/chiasmata   (1)

        1.5.3   Ovary✓   (1)

        1.5.4   (a) Crossing over✓   (1)

                  (b) Prophase I✓   (1)

                  (c) ova✓/gametes/sex cells   (1)

        1.5.5   C→ B→ A✓(correct sequence)   (1)
                                                                                             (8)

1.6   1.6.1   (a)   BbTt✓✓   (2)

                  (b)   Black coat✓   short tail✓   (2)

                  (c)   BbTt✓   (1)

        1.6.2   0✓%   (1)

        1.6.3   Bt✓ bT✓
                  (MARK FIRST TWO ONLY)   (2)
                                                                                            (8)

                                                          TOTAL SECTION A: **50**

SECTION B

QUESTION 2

2.1   2.1.1   A transitional fossil shows characteristics✓ of two✓/between genera/species   (2)

        2.1.2   Bipedalism✓/stood upright   (1)

        2.1.3   - Structure of the pelvis✓
                - Cranial volume✓
            (MARK FIRST ONE ONLY)   Any 1   (1)

        2.1.4   - The foramen magnum is located more forward beneath the skull✓, so that
                - the vertebral column extends beneath✓ the skull.
                - The spine is S-shaped ✓to
                - support an upright posture✓
                - The pelvis is shorter and wider✓
                - to support the body above✓the pelvis
            (MARK FIRST TWO ONLY)   Any (2 x 2)   (4)

        2.1.5   - There was a change in diet✓
                - from tough✓/raw to
                - softer✓/cooked food   (3)
                                                            (11)

2.2   2.2.1   (a) MRSA✓   (1)

                  (b) FQRP✓   (1)

        2.2.2 $\dfrac{(20-5)✓}{5} \times \dfrac{100✓}{1}$ **OR** $\dfrac{(15)✓}{5} \times \dfrac{100✓}{1}$

            .   = 300✓%   (3)

2.2.3

Changes in the percentage of antibiotic resistance in MRSA from 1981 to 2001/ over 20 years ✓

Graph plotting Antibiotic resistance (%) in MRSA (y-axis, ✓) against Years (x-axis, ✓):
- 1981: 2
- 1985: 10
- 1989: 15
- 1993: 40
- 1997: 40 ✓✓
- 2001: 60 T✓

Mark allocation for the graph

Criteria	Mark Allocation
Correct type of graph (line graph)	1
Title of graph including both variables	1
Correct label and scale for X-axis	1
Correct label and scale for Y-axis	1
Plotting of points	1 – 1 to 5 points plotted correctly 2 – all 6 points plotted correctly

NOTE:
If the wrong type of graph is drawn, marks will be lost for:
- 'Correct type of graph'
- 'Plotting of points'

If the axes are transposed:
The learner will lose 2 marks for correct label and scale for x and y axes

If learners draw all 3 graphs on the same system of axes:
- Learners will lose the mark for the title
- Learners will lose 1 mark for correct label and scale for y axis
- If all three graphs drawn are labelled, mark the correct MRSA graph
- If all three graphs drawn are not labelled, marks for plotting will be lost

If learners draw three graphs separately mark the first graph

(6)
(11)

2.3   2.3.1   DNA✓   (1)

            2.3.2   First triplet base✓/ TAT /TAG became TAT   (1)

            2.3.3   (a) GUU✓✓   (2)

                        (b) Isoleucine✓✓   (2)
                                                           (6)

2.4   - Double-stranded DNA unwinds✓
        - and unzips✓
        - when the hydrogen bonds break✓
        - One strand is used as a template✓
        - to form mRNA✓
        - using free RNA nucleotides from the nucleoplasm✓
        - the mRNA is complementary to the DNA✓
        - The coded message for protein synthesis is thus
           copied onto mRNA✓   Any 4   **(4)**

2.5   2.5.1   (a)   Male✓ with Tay Sachs disease✓/all 4 symptoms
                              must be given blind, deaf, mentally retarded and paralysed/
                              lose motor skills and mental functions   (2)

                        (b)   Nn✓✓   (2)

                        (c)   Nn✓✓   (2)

            2.5.2   - Since Elizabeth has Tay-Sachs disease✓/nn she had to inherit
                        one recessive allele from each of her parents✓/Portia and
                        Patrick.
                   - Patrick's genotype is Nn✓/heterozygous which means he is a
                        carrier but normal.   (Any 2)   (2)
                                                                     (8)
                                                                     [40]

QUESTION 3

3.1   3.1.1   Mary✓✓
                (MARK FIRST ONE ONLY)   (2)

       3.1.2   There are no matching bands✓/bars/pattern/DNA profile with both
                parents✓   (2)
                                                                                        (4)

3.2   3.2.1   Three✓/3   (1)

       3.2.2 I^A✓ and I^B✓   (2)
                (MARK FIRST TWO ONLY)

       3.2.3

P₁	Phenotype	Blood group A	x	Blood group O✓
	Genotype	I^Ai	x	ii✓
Meiosis				
	G/gametes	I^A, i	x	i, i✓

Fertilisation

F₁   Genotype I^Ai; I^Ai;   ii;   ii ✓

Phenotype   2 blood group A : 2 blood group O✓
Phenotypic ratio is **1 : 1***✓

P₁ and F₁✓
Meiosis and fertilisation✓

*1 compulsory mark + Any 6

OR

P₁	Phenotype	Blood group A	x	Blood group O✓
	Genotype	I^Ai	x	ii✓

Meiosis

Fertilisation

Gametes	I^A	i
i	I^Ai	ii
i	I^Ai	ii

1 mark for correct gametes
1 mark for correct genotypes

F₁   Phenotype   2 blood group A : 2 blood group O✓
                      Phenotypic ratio is **1 : 1***✓

P₁ and
F₁✓   (7)
Meiosis and fertilisation✓   **(10)**

*1 compulsory mark + Any 6

3.3   - An individual inherits one allele from each parent✓
               - The Y chromosome was inherited from the father✓
               - and the recessive allele/X^h was inherited from the mother✓
               - since the mother has two recessive alleles✓/$X^h X^h$
               - A son only needs to get one recessive allele to be haemophiliac✓since the
               - Y-chromosome does not carry any allele to mask the haemophilia allele✓

                                                                          Any 4   **(4)**

3.4   3.4.1   - Determine time/day to collect data✓
                      - Selected an area✓on the island
                      - randomly captured✓ a number of birds of the same species
                      - **measured their beaks**✓
                      - **before the drought**✓
                      - **and during the drought**✓
                      - recorded✓ the number of birds with each beak size
                      (MARK FIRST FOUR ONLY)   Any 4   (4)

       3.4.2   Number of finches before and during the drought✓/(beak size)   (1)

       3.4.3   During the drought there were more finches with larger beaks✓✓
                                          OR
             During the drought there were fewer finches with smaller beaks✓✓   (2)

       3.4.4   - During the drought only hard woody seeds remained✓
                      - Finches with bigger beaks could crack open the seeds more
                         easily✓
                      - had sufficient food✓
                      - and survived✓ and reproduced
                                           OR
                      - During the drought, there were no small, soft seeds✓
                      - Finches with smaller beaks could not crack open the hard
                         woody seeds✓
                      - and had no food✓
                      - did not survive✓to reproduce   Any 3   (3)

       3.4.5   Range (9,8 – 10,3✓) mm/larger   (1)
                                                                         (11)

3.5   3.5.1   (a)   Cloning✓   (1)

                    (b)   Oogenesis✓/gametogenesis/ meiosis   (1)

          3.5.2   -   The donor horse has the desired characteristics✓
                    -     that need to be copied✓
                    -     and be present in the offspring✓/next generation   Any 2   (2)

          3.5.3   -   The nucleus contains all the genetic information✓✓/
                          hereditary characteristics/chromosomes of the champion horse   (2)

          3.5.4   (a)   64✓   (1)

                    (b)   32✓   (1)

                    (c)   64✓   (1)

          3.5.5   -   A gamete is generally haploid✓
                    -     This ovum is diploid✓ since
                    -     it has the nucleus of a somatic cell ✓   Any 2   (2)
                                                                                                (11)
                                                                                                [40]

                                                                      TOTAL SECTION B: **80**

SECTION C

QUESTION 4

Natural selection and speciation

- The original species of anole lizards was separated✓^{S}
- into different populations✓^{S}
- by a geographical barrier✓^{S}
- which is the sea✓^{S}
- There was no gene flow✓^{S}
- between the separated populations✓^{S}
- Each population was exposed to different environmental conditions✓^{N} on each island
- Because there is variation✓^{N} amongst the lizards
- Natural selection occurred independently✓^{N} in each population
- Some had favourable characteristics✓^{N} to survive on a specific island
- while others did not✓^{N}
- The ones that did not have the favourable characteristics died✓ ^{N}
- The ones with the favourable characteristic survived✓ ^{N}
- and reproduced✓ ^{N}
- to pass the gene for the favourable characteristics✓^{N}
- to the next generation✓ ^{N}
- And over many generations the favourable characteristic becomes more frequent in the population✓ ^{N}
- each population became different from the other✓^{S} over time
- genotypically ✓^{S}
- and phenotypically✓^{S}
- Even if the populations were to mix again✓^{S}
- they would not be able to reproduce/interbreed with each other✓^{S} Max 17

NOTE: ✓^{S} = SPECIATION
**   ✓^{N} = NATURAL SELECTION**

                   Content: (17)
                   Synthesis: (3)
                       (20)

ASSESSING THE PRESENTATION OF THE ESSAY

Criterion	Relevance (R)	Logical sequence (L)	Comprehensive (C)
Generally	All information provided is relevant to the topic.	Ideas arranged in a logical sequence.	Answered all aspects required by the essay.
In this essay (Q4)	Only information relevant to the description of natural selection and speciation is given.	The descriptions for natural selection and speciation are logical and sequential.	At least **6** correct points in the description of natural selection and **6** correct points on speciation are given.
Mark	1	1	1

                   TOTAL SECTION C: 20
                   GRAND TOTAL: 150