education

Department:
Education
PROVINCE OF KWAZULU-NATAL

NATIONAL
SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES-P2

PREPARATORY EXAMINATION

SEPTEMBER 2019

MARKING GUIDELINE

MARKS: 150

This memorandum consists of 9 pages.

PRINCIPLES RELATED TO MARKING LIFE SCIENCES 2019

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   C✓✓
           1.1.4   A✓✓
           1.1.5   A✓✓
           1.1.6   B✓✓
           1.1.7   B✓✓
           1.1.8   C✓✓
           1.1.9   B✓✓
           1.1.10   D✓✓   (10 x 2)   **(20)**

1.2   1.2.1   Centriole✓/centrosome
           1.2.2   Peptide✓bond
           1.2.3   Gene✓
           1.2.4   Biogeography✓
           1.2.5   Stereoscopic vision/ Binocular✓
           1.2.6   Stem cells✓
           1.2.7   Genetic engineering✓/modification
           1.2.8   Continuous✓variation
           1.2.9   Colour blindness✓
           1.1.10   Hominidae✓

                                                    (10 x 1)   **(10)**

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

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

1.4   1.4.1   Dihybrid cross✓   (1)

           1.4.2   Aarr✓   (1)

           1.4.3   (a)   Mottled coat and round ears✓   (1)

                      (b)   Mottled coat and long ears✓   (1)

           1.4.4   AaRr✓   (1)
                                                        (5)

1.5	1.5.1	Phylogenetic tree✓	(1)

1.5.2   *Homo erectus***✓   (1)

1.5.3   - *Australopithecus africanus*✓
         - *Homo habilis*✓
         (Mark first TWO only)   (2)

1.5.4   3 million✓ years✓   (2)

1.5.5   2 million years ago✓   (1)

1.5.6   - Taung child✓
         - Mrs Ples✓
         - Little Foot✓ (Recently classified as *A.prometheus*)   Any   (2)
         (Mark first TWO only)   **(9)**

                                                      TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1   2.1.1   Chromosome✓   (1)

2.1.2   Holds the two chromatids together✓/ attaches the chromosome to
         the spindle fibres   (1)

2.1.3   Crossing over✓   (1)

2.1.4   - No exchange of genetic material✓
         - leading to **decreased** variation✓   (2)

2.1.5   Prophase I✓   (1)

2.1.6   Chiasma✓   (1)

2.1.7   -   Chromosome arrange randomly✓
             -    at the equator✓
             -    during metaphase 1✓
             -    and metaphase 2✓   (4)
                                                                            (11)

2.2 2.2.1 5✓   (1)

    2.2.2 - Both parents are heterozygous✓
        - therefore, their son inherited one recessive allele from each
         parent✓   (2)

    2.2.3 (a) RR✓ and Rr✓   (2)

        (b) Rr✓   (1)

    2.2.4 Male without cystic fibrosis✓   (1)

    2.2.5 -The son of individual **4** and **5** ✓
        - would have inherited a recessive allele from his mother✓
        - Therefore, the son would have had cystic fibrosis✓/the disorder (3)
                         (10)

2.3 2.3.1 Production of identical offspring using biotechnology✓ (1)

    2.3.2 (a) 27✓   (1)

        (b) Female✓   (1)

        (c) - Dolly was a female✓
          - and would have been genetically identical to the parent whose
           somatic cell was used✓
               OR
         - The sheep from which the somatic cell was taken,✓
         - was the same sheep that the ovum was taken from✓ (2)

        (d) - Because a nucleus of a somatic cell is diploid✓
          - like a zygote✓   (2)
                         (7)

2.4 2.4.1 - Only mutations in the gametes✓
        - are passed onto the offspring✓   (2)

    2.4.2 - A female offspring will inherit the X chromosome from the father✓
        - which carries the dominant allele ✓
        - which causes the disorder✓   (3)

                  Please turn over

2.4.3   **P₁**   Phenotype   Normal female   x   Affected male✓

            Genotype $X^t X^t$ x $X^T Y$✓

Meiosis

                           X^t, X^t x X^T,   Y✓

Fertilisation

   F₁   Genotype $X^T X^t$, $X^t Y$, $X^T X^t$, $X^t Y$✓

             Phenotype   2 affected females   2 Normal males✓

                 0% chance of affected male offspring✓*****

P₁ and F₁✓
Meiosis and fertilisation✓

                               *Compulsory 1 + Any 6

OR

   P₁   Phenotype   Normal female   x   Affected male✓

            Genotype $X^t X^t$ x $X^T Y$✓

Meiosis

Fertilisation

   F₁

Gametes	X^T	Y
X^t	$X^T X^t$	$X^t Y$
X^t	$X^T X^t$	$X^t Y$

1 mark for correct gametes
1 mark for correct genotypes

         Phenotype   2 affected females   2 Normal males✓

           0% chance of affected male offspring✓*****

P₁ and F₁✓   (7)

Meiosis and fertilisation✓   **()**

                          *Compulsory 1 + Any 6   **[40]**

OR

P₁   Phenotype   Normal female x   Normal male✓

            Genotype $X^t X^t$ x $X^t Y$✓

Meiosis $X^t,\ X^t$ x $X^t,\ Y$✓

Fertilisation

F₁   Genotype $X^t X^t,\ \ X^t Y,\ \ \ \ X^t X^t,\ \ \ X^t Y$✓

            Phenotype   2 normal females 2 normal males✓

                        0% chance of affected male offspring✓*

P₁ and F₁✓

Meiosis and fertilisation✓

                        *Compulsory 1 + Any 6

OR

P₁   Phenotype   Normal female x Normal male✓

            Genotype $X^t X^t$ x $X^t Y$✓

Meiosis

Fertilisation

Gametes	Xt	Y
X^t	$X^t X^t$	$X^t Y$
X^t	$X^t X^t$	$X^t Y$

F₁

1 mark for correct gametes

1 mark for correct genotypes

            Phenotype   2 normal females   2 normal males✓

                 0% chance of affected male offspring✓*

P₁ and F₁✓

Meiosis and fertilisation✓

                     *Compulsory 1 + Any 6

QUESTION 3

3.1   3.1.1   - The complementary strand formed contains uracil✓
                 - instead of thymine✓

<div align="center">OR</div>

                 - One strand of DNA molecule✓
                 - is used as a template✓   Any   (2)

        3.1.2   Nucleus✓   (1)

        3.1.3   mRNA✓   (1)

        3.1.4   - Determines the order of t-RNA✓/anticodons
                 - to bring amino acids in a specific order✓
                 - to form a particular protein✓   (3)

        3.1.5   AAU✓   (1)

        3.1.6   - DNA molecule carries the code✓
                 - which is copied onto m-RNA✓/ transcription
                 - which allows the t-RNA✓
                 - to bring the required amino acids✓/ translation   (4)
                                                                    (12)

3.2   3.2.1   Thembi✓/Mary   (1)

        3.2.2   - Some of the DNA bars✓ of Mpume
                 - are in the same position with that of Thembi✓/Mary   (2)

        3.2.3   - Human error may occur✓during interpretation of DNA
                 - leading to incorrect information✓

                 - Swopping of specimens may occur in the laboratory✓
                 - leading to innocent suspects becoming a criminal✓

                 - DNA may escape the skin cells and found on the crime scene✓
                 - leading to innocent individual made a criminal✓

                 - Private laboratories may not follow uniform standards and quality✓
                 - leading to poor results✓
                 (Mark first TWO only)   Any(2 x 2) (4)
                                                                   (7)

3.3   - There is variation in saguaro cacti✓
          - Some have smooth stems; others have pleated stems✓
          - Saguaro cacti with smooth stems didn't store water for longer periods✓
          - and died out✓
          - Saguaro cacti with pleated stems store water for longer periods✓
          - and survive✓
          - and reproduce passing on their gene for pleated stem to the next generation✓
                                                                 Any   **(6)**

3.4   - If a population of a single species becomes separated✓/ splits into two
           - by a geographical barrier
           - There is now no gene flow✓ between the two populations
           -Since each population may be exposed to different environmental
             conditions✓/the selection pressure may be different
           - Natural selection occurs independently✓ in each of the two populations
           - such that the individuals of the two populations become very different from
             each other genotypically and phenotypically✓
           - Even if the two populations were to mix they will not be able to interbreed✓
           - The two populations are now different species✓   Any   **(6)**

3.5   3.5.1   - Same type of antibiotic used✓
                     - Investigation done in the same hospitals✓/same area
                     - Same type of bacterial infections treated✓
                     - Same concentration of the antibiotic✓
                     - Patients of the same age of patient✓
                     - Patients of the same gender✓
                     - Patients of the same body mass✓   Any   (3)
                  (Mark first THREE only)

        3.5.2 $25 \div 100$ x   4000✓ =   1000

                 $4000 - 1000$✓

                 = 3000✓ patients successfully treated

                                 OR
                 $75 \div 100$✓ x 4000✓

                 = 3000✓   (3)

        3.5.3   -   Investigation was done in 100 hospitals✓/large sample
                      -    Long period of the investigation✓   Any   (1)
                      (Mark first ONE only)

        3.5.4   Bacterial resistance to Vancomycin antibiotic has increased over
                 time✓✓   (2)
                                                           (9)
                                                           [40]

                                   TOTAL SECTION B: **80**

SECTION C

QUESTION 4

Structural features characterising bipedalism(B)
- Spine✓
- is S-shaped✓
- to keep the body upright✓

- Pelvis✓
- is wide and short ✓
- to support upper body weight✓

- Foramen magnum✓
- is in forward position✓
- to allow the spinal cord to enter the skull vertically✓   Any   (7)

Advantages of bipedalism(A)
- Have a better view of surroundings✓
- to see predators at a distance✓

- More efficient locomotion✓
- to escape from predators✓/ to find food

- Display of sex organs✓
- as part of courtship behaviour✓

- Freeing hands✓
- for carrying offspring/objects✓

- Increased surface area✓
- for reducing overheating✓   Any   (6)

Challenges of relying on fossil evidence(F)
- Many fossil records are incomplete✓
- Not all organism is fossilised✓/ don't fossilise easily
- Many fossils have been destroyed✓ by earth's movement
- Some fossils are wrongly classified✓
- There might be some missing links✓
- Makes it difficult to establish relationships amongst species✓   Any   (4)

Content: 17
Synthesis: 3
(20)

ASSESSING THE PRESENTATION OF THE ESSAY

Relevance	Logic sequence	Comprehensive
All information provided is relevant to the question	Ideas arranged in a logical cause-effect sequence	Answered all aspects required by the essay in sufficient detail
All the information provided is relevant to the: - Features characterising bipedalism - Significance of bipedalism - Challenges of relying on fossil evidence No irrelevant information given	All the information regarding the: - Features characterising bipedalism - Significance of bipedalism - Challenges of relying on fossil evidence Is arranged in a logical manner	At least the following points should be included: - Features characterising bipedalism 5/7 - Significance of bipedalism 4/6 - Challenges of relying on fossil evidence 2/4
1 mark	**1 mark**	**1 mark**

TOTAL SECTION C: 20
GRAND TOTAL: 150