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 or diagrams are given instead of descriptions**
   Candidates will lose marks.

8. **If sequence is muddled and links do not make sense**
   Where the 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 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 to the memorandum**
   No changes must be made to the memoranda without consulting the provincial internal moderator 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 D ✓ ✓  
1.1.2 D ✓ ✓  
1.1.3 C ✓ ✓  
1.1.4 C ✓ ✓  
1.1.5 D ✓ ✓  
1.1.6 B ✓ ✓  
1.1.7 B ✓ ✓  
1.1.8 B ✓ ✓  
1.1.9 D ✓ ✓  
1.1.10 A ✓ ✓  
(10 x 2) (20)

1.2  
1.2.1 Complete dominance ✓  
1.2.2 Cloning ✓  
1.2.3 Population ✓  
1.2.4 Stereoscopic ✓ / Binocular  
1.2.5 Hominidae ✓ / Hominids  
1.2.6 Down syndrome ✓ / trisomy 21  
1.2.7 Transcription ✓  
1.2.8 Homologous ✓  
1.2.9 Locus ✓  
1.2.10 Discontinuous variation ✓  
(10 x 1) (10)

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

1.4  
1.4.1 (a) Big ✓ and green ✓ fruit  
(b) BG, Bg, bG, bg ✓ ✓  
1.4.2 0 ✓ % ✓  
(2)  
(2)

1.5  
1.5.1 W Cell membrane ✓ / Plasmalemma  
X Homologous chromosomes ✓ / Bivalent  
1.5.2 (a) 4 ✓  
(b) 2 ✓  
(1)  
(1)

1.5.3 D ✓  
(1)

1.5.4 Y Holds the sister chromatids together ✓  
Z Pulls chromosomes/chromatids to the poles ✓  
(2)

1.5.5 Telophase II ✓  

**TOTAL SECTION A:** (8) [50]
SECTION B

QUESTION 2

2.1 (11/100) √ x 2000 √ = 220 √ (3)

2.1.1 - Repeat √ the investigation
- Use a larger sample size √ / more dogs

(Mark first TWO only)

2.1.2 Any 2 (2)

2.1.3 The breed of the dogs √
(Mark first ONE only) (1)

2.1.4 - The disorders are inherited √
- and therefore does not change with age √ (2)

2.1.5 Autosomal recessive inheritance causes most of the genetic disorders in dogs √ (2)

(10)

2.2. P₁ Phenotype Rough hair x Smooth hair √
Genotype Hh x hh √

Meiosis
G/gametes
F₁ Phenotype
Genotype Hh
Fertilisation
Phenotypic ratio
1 rough hair : 1 smooth hair √
P₁ and F₁ √
Meiosis and fertilisation √ Any 6

OR

P₁ Phenotype Rough hair x Smooth hair √
Genotype Hh x hh √

Meiosis
Gametes
Fertilisation

<table>
<thead>
<tr>
<th>Gametes</th>
<th>H</th>
<th>h</th>
</tr>
</thead>
<tbody>
<tr>
<td>h</td>
<td>Hh</td>
<td>hh</td>
</tr>
<tr>
<td>h</td>
<td>Hh</td>
<td>hh</td>
</tr>
</tbody>
</table>

1 mark for correct gametes
1 mark for correct genotypes

F₁ Phenotypic ratio
1 rough hair : 1 smooth hair √
P₁ and F₁ √
Meiosis and fertilisation √ Any 6 (6)
2.3  
2.3.1  
(a) DNA✓
(b) Ribosome✓

2.3.2  
(a) 2✓
(b) 5✓
(c) 7✓

2.3.3  
- The mRNA attaches to the ribosome✓
- When each codon✓ of the mRNA
  - matches with the anticodon✓ on the tRNA
  - the tRNA brings the required amino acid to the ribosome✓
  - When the different amino acids are brought in sequence✓
  - adjacent amino acids are linked by peptide bonds✓
  - to form the required protein✓/polypeptide

Any 4

2.3.4  
(a) CCT✓✓
(b) CCU✓✓

2.3.5  
<table>
<thead>
<tr>
<th>DNA</th>
<th>RNA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has deoxyribose✓ sugar</td>
<td>Has ribose✓ sugar</td>
</tr>
<tr>
<td>Has nitrogen base thymine (T)✓/ A, C, G and T</td>
<td>Has nitrogen base uracil(U)✓/ A, C, G and U</td>
</tr>
</tbody>
</table>

(Mark first TWO only) (2 x 2)

TABLE NOT REQUIRED

2.4.1  
Embryos✓/Blastocysts
Umbilical cord✓/ Placenta
Bone marrow✓

(Mark first ONE only) Any 1

2.4.2  
- Stem cells are undifferentiated✓
  - and have the potential to develop into any type of cell✓
  - to replace the affected/defective cells✓ causing the disorder

Any 3

2.4.3  
- To produce ova✓ which could be used
  - in cases where females do not have functional ovaries✓
  - and are therefore infertile✓ and thereby
  - allowing them to have children✓

Any 3

QUESTION 3

3.1 3.1.1 - The DNA molecule unwinds ✓
- Hydrogen bonds between the two strands break ✓/ the molecule unzips
- Each strand serves as a template ✓
- Free nucleotides ✓ attach to the individual strands
- with complementary nitrogen bases ✓ pairing
- Two identical DNA molecules ✓ are formed
- Process is controlled by enzymes ✓

Any 5 (5)

3.1.2 - If the incorrect nitrogen base ✓ attaches to the original strand if a nitrogen base is added or deleted
- the sequence ✓/ order of the bases changes on the new DNA molecule
- resulting in a change in the gene structure ✓

Any 2 (2)

3.2 3.2.1 ‘Out of Africa’ hypothesis ✓

3.2.2 Mitochondrial DNA ✓/ mtDNA

3.2.3 - The mitochondrial DNA is only inherited from the mother ✓
- Any mutation ✓ on this DNA
- can be traced ✓ along the maternal line only

(3)

3.2.4 Fossil evidence ✓
Archaeological evidence ✓
(Mark first ONE only)

Any 1 (1)

(6)

3.3 - A population of a species becomes separated ✓ by a geographical barrier
- then the population splits into different populations ✓
- There is no gene flow ✓ between the populations
- Each population may be exposed to different environmental conditions ✓
- Natural selection occurs independently ✓ in each population
- The individuals of each population become different from each other ✓ over time
- genotypically and phenotypically ✓
- Even if the two populations were to mix again ✓
- they would not be able to reproduce with each other ✓ and are thus different species

Any 6 (6)
3.4.1 X - Foramen magnum✓
Y - Canine✓

3.4.2 - The foramen magnum is located in a more forward position✓ below the skull
- showing that organism C is bipedal✓
- This allows for the vertebral column/spine to extend vertically✓ from the base of the skull
- to balance the body weight in upright walking✓ Any 3 (3)

3.4.3 (a) B✓
(b) A✓

3.4.4 - There is an increase✓
- in the cranium size✓ from organism B to organism C
- This will allow it to house a larger brain✓/cerebrum which suggests greater intelligence (3)

3.4.5

<table>
<thead>
<tr>
<th>Skull B</th>
<th>Skull C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brow ridges pronounced✓</td>
<td>Brow ridges are not as pronounced✓</td>
</tr>
<tr>
<td>More protruding jaws✓/larger jaws</td>
<td>Less protruding jaws✓/ smaller jaws</td>
</tr>
</tbody>
</table>

(Mark first TWO only) Table1 + (2 x 2) (5) (15)

3.5 3.5.1 - Because they were normal they must each have one dominant allele✓
- and in order for their children to be affected each parent must have one recessive allele✓ (2)

3.5.2 NN✓ or Nn✓ (2)

3.5.3 - The father would have been affected✓ if it was sex-linked
- in order for the daughter to be affected✓ (2) (6) [40]

TOTAL SECTION B: 80
SECTION C

QUESTION 4

Lamarckism
- The ancestral elephant stretched its proboscis
- to get leaves in trees/further from the body
- The more it used the proboscis, the longer it became
- The offspring then inherited the acquired longer proboscis
- Over many generations the length of the proboscis increased
- until it became a trunk as in the modern elephant

Any 5 (5)

Darwinism
- There was a great deal of genetic variation amongst the offspring
- Some had long proboscis
- and some had short proboscis
- There was a change in environmental conditions/competition amongst the animals for food
- They had to reach higher in the trees to get leaves
- The animals with shorter proboscis died
- Those individuals with the longer proboscis survived
- They then reproduced
- and passed on this characteristic to their offspring
- The next generation of animals had a greater proportion of animals with longer proboscis

Any 9 (9)

Artificial selection
- Humans select the elephants with desirable characteristics/long trunk
- and mate them to produce offspring with longer trunks
- Those that are pure breeding for long trunks
- are further selected to mate to produce offspring with further longer trunks

Any 3 (3)

Content: (17)
Synthesis: (3)

Total (20)

ASSESSING THE PRESENTATION OF THE ESSAY

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Relevance (R)</th>
<th>Logical sequence (L)</th>
<th>Comprehensive (C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generally</td>
<td>All information provided is relevant to the question</td>
<td>Ideas are arranged in a logical/cause-effect sequence</td>
<td>All aspects required by the essay have been sufficiently addressed</td>
</tr>
<tr>
<td>In this essay in Q4</td>
<td>Only information relevant to the explanations in terms of Lamarckism, Darwinism and artificial selection are provided</td>
<td>Explanations in terms of Lamarckism, Darwinism and artificial selection are provided in a logical and sequential manner.</td>
<td>At least 3 correct points for the explanation using Lamarckism, 6 correct points for the explanation using Darwinism and 2 correct points using artificial selection</td>
</tr>
</tbody>
</table>

Mark 1 1 1

TOTAL SECTION C: 20
GRAND TOTAL: 150