



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

SEPTEMBER 2019

**LIFE SCIENCES P2
MARKING GUIDELINE**

MARKS: 150

This marking guideline 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 parts.
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 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. Marking guideline 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.

SECTION A**QUESTION 1**

- | | | | | |
|-----|--------|---|----------|------|
| 1.1 | 1.1.1 | B ✓✓ | | |
| | 1.1.2 | A ✓✓ | | |
| | 1.1.3 | B ✓✓ | | |
| | 1.1.4 | A ✓✓ | | |
| | 1.1.5 | B ✓✓ | | |
| | 1.1.6 | C ✓✓ | | |
| | 1.1.7 | C ✓✓ | | |
| | 1.1.8 | D ✓✓ | | |
| | 1.1.9 | D ✓✓ | | |
| | 1.1.10 | C ✓✓ | (10 x 2) | (20) |
| 1.2 | 1.2.1 | Homozygous ✓ | | |
| | 1.2.2 | (Gregor) Mendel ✓ | | |
| | 1.2.3 | Reproductive isolating mechanisms ✓ | | |
| | 1.2.4 | Stem cells ✓ | | |
| | 1.2.5 | Double helix ✓ | | |
| | 1.2.6 | Interphase ✓ | | |
| | 1.2.7 | Prognathous ✓ | | |
| | 1.2.8 | Down Syndrome ✓ / Trisomy 21 | | (8) |
| 1.3 | 1.3.1 | B only ✓✓ | | |
| | 1.3.2 | A only ✓✓ | | |
| | 1.3.3 | A only ✓✓ | (3 x 2) | (6) |
| 1.4 | 1.4.1 | Meiosis ✓ | | (1) |
| | 1.4.2 | (a) Crossing over ✓ | | (1) |
| | | (b) testis ✓ / testicle | | (1) |
| | 1.4.3 | (a) A – Chromatid ✓ | | (1) |
| | | (b) B – Centromere ✓ | | (1) |
| | | (c) C – Homologous chromosomes / pair / bivalents ✓ | | (1) |
| | | (d) D – Centriole ✓ / centrosome | | (1) |
| | 1.4.4 | (a) Metaphase I ✓ | | (1) |
| | | (b) Anaphase II ✓ | | (1) |
| | 1.4.5 | TWO ✓ / 2 | | (1) |
| 1.5 | 1.5.1 | Two characteristics ✓ are involved in the cross | | (1) |
| | 1.5.2 | BbHh ✓ | | (1) |
| | 1.5.3 | (a) Bbhh ✓ | | (1) |
| | | (b) Black, horned ✓ | | (1) |
| | 1.5.4 | 8 ✓✓ | | (2) |

TOTAL SECTION A: 50

QUESTION 2

- 2.1 2.1.1 Protein synthesis ✓ (1)
- 2.1.2 (a) mRNA ✓/ messenger RNA (1)
- (b) Ribosome ✓ (1)
- (c) Nuclear membrane ✓ (1)
- 2.1.3 A G U ✓ (1)
- 2.1.4 S – R – P – Q ✓✓ (2)
- 2.1.5 Cytoplasm ✓ (1)
- 2.1.6 - The DNA molecule unwinds ✓
- and unzips / weak hydrogen bonds break ✓
- one side of the DNA molecule forms a template ✓
- free floating **RNA** nucleotides from the nucleolus ✓
- join to their complementary base pairs ✓ (T-A; C-G)
- to form a new strand of mRNA ✓ (Any 5 x 1) (5)
- 2.1.7 - If nitrogenous base A was replaced by G it would mean that the codon would change to AGC ✓
- which may code for a different anticodon ✓/ UCA instead of AGU
- and a different amino acid ✓
- which may change the protein formed ✓ (4)
- 2.2 2.2.1 A sudden change in the DNA sequence ✓/ structure of a gene leading to altered characteristics. (1)
- 2.2.2 Pedigree ✓ diagram (1)
- 2.2.3 3 ✓ (1)
- 2.2.4 - Individual 8/13/15 has the disease ✓
- therefore his/her parents must both be carriers of the disease ✓
- but they do not express the characteristic ✓
- therefore, it must be recessive (3)

2.2.5

P₁	Phenotype	Normal male	x	Normal female ✓
	Genotype	Nn	x	Nn ✓
Meiosis	G/gametes	N, n	x	N, n ✓
Fertilisation				
F₁	Genotype	NN ; Nn ; Nn ; nn ✓		
	Phenotype	3 Normal and 1 cystic fibrosis		

They have a **25%** ✓* chance of having a child with cystic fibrosis

P₁ and F₁ ✓
Meiosis and fertilisation ✓

(1* compulsory + Any 5)

OR

P₁	Phenotype	Normal male	x	Normal female ✓												
	Genotype	Nn	x	Nn ✓												
Meiosis	G/gametes	N, n	x	N, n ✓												
Fertilisation																
F₁	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Gametes</td> <td>N</td> <td>n</td> </tr> <tr> <td>N</td> <td>NN</td> <td>Nn</td> </tr> <tr> <td>n</td> <td>Nn</td> <td>nn</td> </tr> <tr> <td colspan="3">Correct genotypes ✓</td> </tr> </table>				Gametes	N	n	N	NN	Nn	n	Nn	nn	Correct genotypes ✓		
Gametes	N	n														
N	NN	Nn														
n	Nn	nn														
Correct genotypes ✓																
	Phenotype	3 Normal and 1 cystic fibrosis														

They have a **25%** ✓* chance of having a child with cystic fibrosis

P₁ and F₁ ✓
Meiosis and fertilisation ✓

(1* compulsory + Any 5)

(6)

- 2.3.1 Any disease or abnormal condition that is determined by a gene/allele that is carried on the gonosomes ✓ / sex chromosomes / X or Y chromosomes. (1)

- 2.3.2 At the age of 3 ✓ years (old) (1)

- 2.3.3
 - The gene is found on the X chromosome ✓
 - Boys only have one X chromosome ✓
 - If that X chromosome carries the Duchenne's gene ✓
 - the boy will have Duchenne's muscular dystrophy ✓
 - as there is no other allele to mask it. ✓ (Any 4 x 1) (4)

- 2.4 2.4.1 Cloning ✓ (1)

- 2.4.2
 - Allows people to produce organisms with selected beneficial traits ✓
 - Animals in danger of extinction could be saved. ✓
 - Production of organs ✓ for transplants
 - Mark first TWO only** (Any 2 x 1) (2)

- 2.4.3
 - A diploid cell ✓ / a cell with all the genetic information is needed
 - as a gamete is a haploid cell ✓ / only contains half the genetic information (2)

[40]

QUESTION 3

3.1 3.1.1 A and C ✓✓ (2)

3.1.2 - Organisms that have similarities in the structure ✓
- indicates common ancestry ✓ (2)

3.1.3 - Fossil record ✓
- Biogeography ✓
- Genetics ✓
Mark first TWO only (Any 2 x 1) (2)

3.2 3.2.1 - Random arrangement of chromosomes ✓ } **OR** Meiosis ✓
- crossing over ✓
- random mating ✓
- random fertilisation ✓
- mutations ✓
Mark first THREE only (Any 3 x 1) (3)

3.2.2 - The deer are either black or white. ✓
- There is no intermediate characteristic ✓/ grey (2)

3.2.3

Darwinism	Punctuated Equilibrium
Gradual change ✓	Rapid change ✓
takes place over a long period of time ✓	takes place with in a relatively short period of time ✓
Change is continuous ✓	Long periods of no change ✓

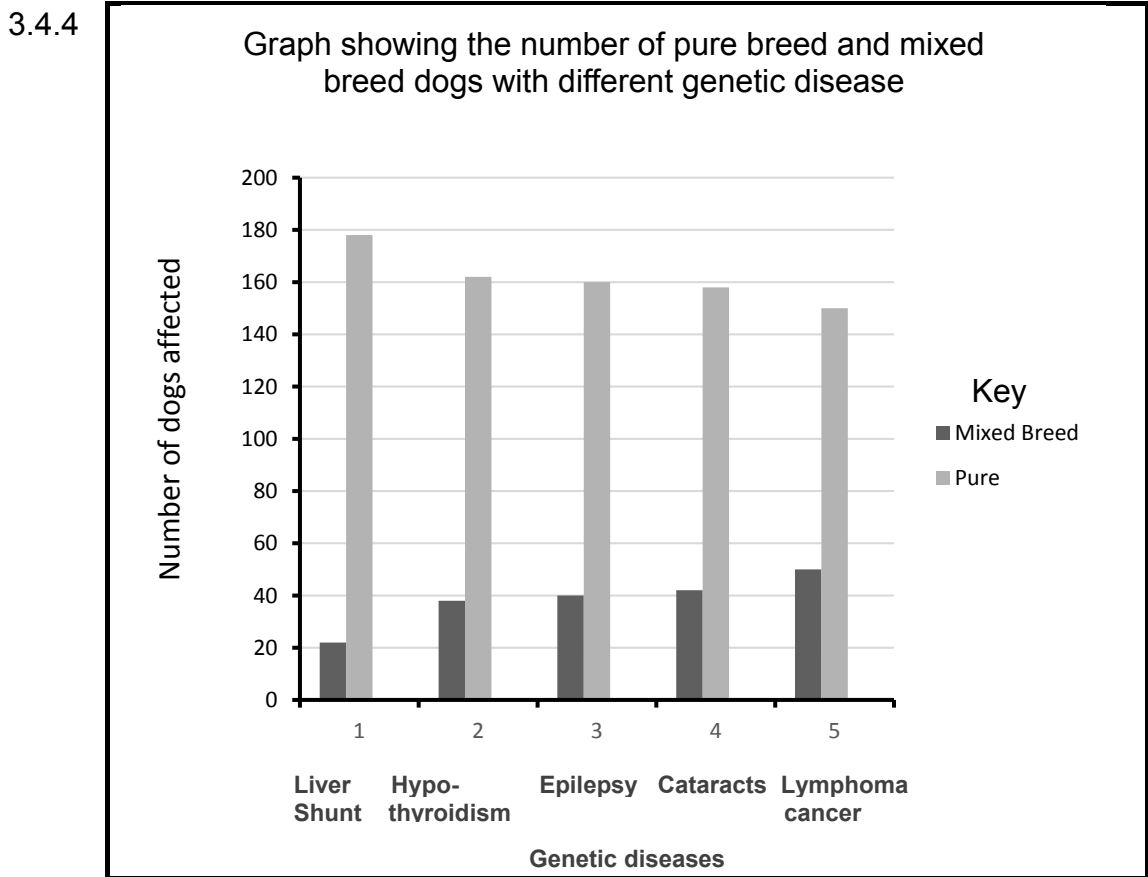
Mark first TWO only Table ✓ + Any 4 (5)

3.3 - The common ancestor ✓ original baobab population
- was separated ✓ into different populations
- by the sea ✓*/ due to continental drift
- There was no gene flow ✓ between the populations
- Each population was exposed to different environmental conditions ✓/
different selection pressures.
- Natural selection occurred independently ✓ in each population.
- the individuals in the two populations became different ✓ from each
other over time
- genotypically and phenotypically ✓
- Even if the two are to mix again ✓
- they will not be able to interbreed ✓
- forming different baobab species (1* compulsory + Any 5) (6)

3.4 3.4.1 Breed of dog ✓
 Genetic disease ✓
Mark first TWO only (2)

3.4.2 Percentage of mixed breed dogs with cataracts
 $= \left[\frac{42}{200} \times 100 \right] \checkmark = 21\% \checkmark$ (2)

3.4.3 Pure breed dogs suffer from genetic diseases more than mixed breed dogs ✓✓ (2)



Marking guideline:

Caption (C) Both variables included	1 Mark
Type of graph (T)	1 Mark
X-axis label, width of bars even (X)	1 Mark
Y-axis label and scale (Y)	1 Mark
Plotting of point (P)	0 Mark – No points plotted correctly
	1 Mark – 1 to 6 points plotted correctly
	2 Marks – all points plotted correctly

(6)

- 3.4.5 Natural selection takes place due to selective pressure of the environment. ✓/Individuals with characteristics that help them to survive in nature are selected.
In artificial selection humans are the selective pressure. ✓/ The characteristics that are selected is what humans want/not necessarily helping them to survive. (2)
- 3.4.6 All dogs are able to interbreed ✓ and produce fertile offspring. ✓ (2)
- 3.4.7 It is not ethically correct ✓ as more artificially bred / pure breed dogs suffer from genetic diseases than mixed breed dogs. ✓ (2)
- [40]**

TOTAL SECTION B: 80

SECTION C**QUESTION 4****Changes in the skull and parts of the skeleton that support bipedalism:**

- The foramen magnum has moved to the base of the skull ✓ so that the head can be held vertically. ✓ / spinal cord can be in line with the brain
- The position of the pelvic girdle moved to under / the bottom of the core body ✓ so it is suitable to carry the weight of the upper body ✓
- The pelvis has become more cup shaped / wider and shorter ✓ which makes it suitable to carry the core / weight of the upper body ✓
- The vertebral column changed from C-shape to S-shaped ✓ / greater lumbar curvature in spine for better balance ✓ / support of upper body weight

(Any 3 x 2) (6)

Changes in skull that support change in diet:

- Reduction in the size of teeth ✓ / canines ✓
- Reduction in jaw size ✓
- Reduction of cranial brow ridges ✓
- and cranial ridges ✓ due to
- smaller muscles for chewing ✓
- Indicate that modern humans changed from a diet of raw food ✓ to
- a diet of softer / cooked food ✓
- that does not require the same amount of chewing ✓ / tearing / biting

(Any 6 x 1) (6)

Changes in the skull that support improved communication and use of tools:

- a larger cranium ✓
- indicated a larger brain size ✓
- which can process a larger amount of information ✓
- at a faster speed ✓
- This has led to the development artificial language ✓ for communication
- And the invention / greater use of tools and weapons ✓

(Any 5 x 1) (5)

ASSESSING THE PRESENTATION OF THE ESSAY

Criterion	Relevance (R)	Logical sequence (L)	Comprehensive (C)
Generally	All information provided is relevant to the question.	Ideas are arranged in a logical/cause-effect sequence.	All aspects required by the essay have been sufficiently addressed.
In this essay in Q4	<p>Only information relevant to the description of:</p> <ul style="list-style-type: none"> - Changes in skull and skeleton that support bipedalism, change in diet and improved communication and use of tools. <p>There is no irrelevant information.</p>	<p>All the information regarding the:</p> <ul style="list-style-type: none"> - Changes in skull and skeleton that support bipedalism, change in diet and improved communication and use of tools. <p>Is given in a logical manner.</p>	<p>At least:</p> <ul style="list-style-type: none"> - 4/6 for changes in skull and skeleton that support bipedalism - 4/6 for changes in skull that support changes in diet - 3/5 for improved communication and use of tools
Mark	1	1	1

Content (17)
Synthesis (3)

TOTAL SECTION C: 20
GRAND TOTAL: 150