



LIMPOPO

PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

NATIONAL
SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P2
SEPTEMBER 2021
MARKING GUIDELINES

MARKS: 150

This Marking Guideline consists of 12 pages

PRINCIPLES RELATED TO MARKING LIFE SCIENCES 2021

1. **If more information than marks allocated is given**
Stop marking when the maximum mark 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 the whole process is given when only part of it is required**
Read all and credit the 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 are incorrect, do not credit. If sequence and links becomes correct again, resume credit.
9. **Non-recognisable 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, 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 Provincial 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**
Memorandum will allocated marks for units separately, except where it is already given in the question.
16. **Be sensitive to the sense of an answer, which may be stated in a different way.**

17. Caption

Credit will be given for captions to all illustrations (diagrams, graphs, tables etc.) except where it is already given in the question.

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 | B | ✓✓ |
| 1.1.3 | C | ✓✓ |
| 1.1.4 | B | ✓✓ |
| 1.1.5 | C | ✓✓ |
| 1.1.6 | A | ✓✓ |
| 1.1.7 | C | ✓✓ |
| 1.1.8 | B | ✓✓ |
| 1.1.9 | C | ✓✓ |
| 1.1.10 | D | ✓✓ |

(10x2)

(20)

1.2

- | | |
|-------|------------------------|
| 1.2.1 | Punctuate equilibrium✓ |
| 1.2.2 | Homologous ✓ |
| 1.2.3 | Biogeography ✓ |
| 1.2.4 | Transitional ✓ |
| 1.2.5 | Double helix ✓ |
| 1.2.6 | Incomplete dominance ✓ |
| 1.2.7 | Gene pool ✓ |
| 1.2.8 | Foramen magnum ✓ |
| 1.2.9 | Continuous ✓variation |

(9x1)

(9)

1.3

- | | | |
|-------|--------|----|
| 1.3.1 | A only | ✓✓ |
| 1.3.2 | B only | ✓✓ |
| 1.3.3 | A only | ✓✓ |
| 1.3.4 | None | ✓✓ |
| 1.3.5 | A only | ✓✓ |

(5x2)

(10)

1.4

1.4.1 Suspect 3 ✓✓ (2)

1.4.2 The bands of the DNA profile of the skin ✓ found under the nails of the victim matches the bands of the DNA profile of the blood of suspect 3 ✓ (2)

1.4.3 Human error could have occurred in the laboratory ✓
Specimens could have been deliberately swapped in the laboratory ✓
Sample of a DNA taken from the victim could not give accurate profile/
large length of DNA is required to get accurate profile ✓
(Any 2) (2)

1.4.4

- Paternity tests ✓
 - Determining identity of dead persons ✓
 - Determining genetic disorders ✓
 - Tracking individuals in population ✓
- (Mark first THREE only)** (3)

1.4.5 The process by which the DNA of a person/ organism is analysed ✓
to obtain a barcode pattern ✓ (2)
(11)

TOTAL SECTION A: 50

SECTION B**QUESTION 2**

2.1

2.1.1 Speciation ✓ (1)

2.1.2

- The fruit flies were separated into two groups ✓ (populations) of the same species ✓
- There is now no gene flow between the two populations ✓
- The fruit flies had different sources of food ✓ / lived under different environmental conditions
- The fruit flies underwent natural selection independently ✓ in each trough.
- Natural selection continued in each trough over many generations, ✓ resulting in each trough having a species that was quite different ✓ genotypically ✓ and phenotypically ✓ from species of the other trough.
- These differences prevented them from interbreeding ✓ and this led to the formation of two new species. ✓

(Any 6) (6)

2.1.3

Lamarck	Darwin
1. Law of use and disuse ✓	1. Natural selection ✓
2. Acquired characteristics are passed on to the next generation ✓	2. Genetic characteristics can be inherited by offspring from parents ✓
3. Organisms have an internal drive to change ✓ / deterministic	3. Organisms do not have an internal drive to change ✓ / nature selects
4. Individuals change ✓	4. Populations change ✓
5. Infers that there is no extinction because organisms adapt and survive ✓	5. Extinction occurs since organisms may have features that do not favour survival ✓

Rubric to assess the Table

Criterion	Mark
A comparison table is drawn with clear headings for each column	1
Any 2 corresponding differences	2 + 2
	(5)

(12)

2.2

2.2.1 Process A-Translocation✓
Organelle B-Ribosome✓ (2)

2.2.2 Translation✓*

- The mRNA strand from the nucleus becomes attached to the ribosome✓ with its codons exposed.
 - Each tRNA molecule carries a specific amino acid✓ according to its anti-codon✓
 - The anti-codon matches up with/is complementary to the codon of the mRNA✓
 - So that the amino acids are placed in the correct sequence✓
 - Adjacent amino acids are linked to form a protein. ✓
- (1x compulsory mark ✓* + any 4 correct points) (5)

2.2.3 (a) Gene mutation ✓ (1)

(b) The amino acid coded for by the changed codon may be:

- different to the original amino acid ✓
- Thus causing a different protein to be produced ✓

OR

- The same as the original amino acid ✓
- Thus there will be no change to the protein produced ✓ (4)

(12)

2.3

2.3.1 50% ✓✓ (2)

2.3.2 **P2** Phenotype Green leaves x Green leaves✓
Genotype Gg x Gg✓
Meiosis
↓ ↓ ↓ ↓
G/Gametes G g x G g ✓
Fertilization
F2 Genotype GG Gg Gg gg ✓
Phenotype 3 green leaves and 1 variegated leaves✓

OR

Gametes	G	g
G	GG	Gg
g	Gg	gg
Correct gametes ✓ Correct offspring genotypes✓		

Phenotype 3 green leaves and 1 variegated leaves✓

P2 and F2 ✓

Meiosis and fertilization ✓

Any 6 (6)

MARKING GUIDELINE

- 2.3.3 (a) One✓/1 (1)
 (b) Two✓/2 (1)
 (c) One✓/1 (1)
- 2.3.4 Mendel's Principle of Independent Assortment:
- The various 'factors'/ alleles controlling the different characteristics/ genes are separate entities, ✓ not influencing each other in any way, and sort themselves out independently during gamete formation. ✓
- OR**
- The alleles of two (or more) different genes✓ get sorted into gametes independently of one another. ✓
- OR**
- The allele that a gamete receives for one gene✓ does not influence the allele received for another gene✓
- (2)
(13)
- 2.4
- 2.4.1 Crossing over ✓ (1)
- 2.4.2 D – Centriole✓ (1)
- 2.4.3 Part F / Spindle threads:
- Allows for the attachment✓ of chromosomes. ✓
 - Contracts ✓ to move chromosomes towards opposite poles ✓
- (any 1 x 2) (2)
- 2.4.4 The chromosomes are arranged in homologous pairs ✓ at the equator. ✓ (2)
- 2.4.5 Ovary ✓ (1)
- 2.4.6 Anaphase I ✓ (1)
- 2.4.7
- Crossing over takes place✓
 - between homologous chromosomes✓
 - leading to genetic material exchange✓
 - There is also random arrangement✓ of chromosomes along the equator. ✓
 - Different combinations of chromosomes move into each daughter cell✓
 - thus leading to variation in gametes✓ produced.
- (5)
(13)

TOTAL QUESTION 2: 50

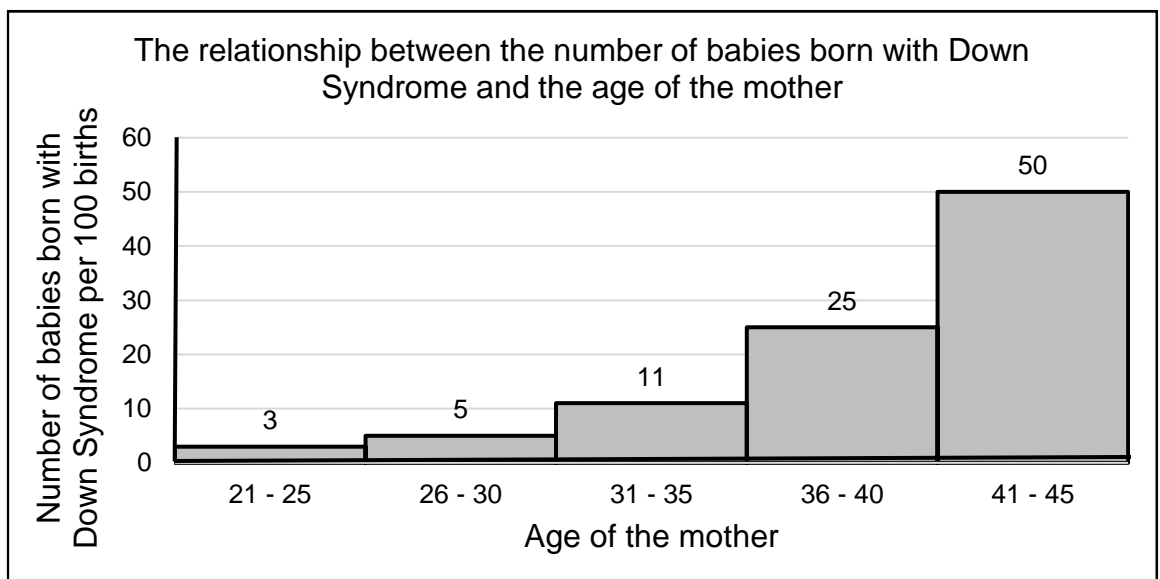
QUESTION 3

3.1

- 3.1.1 4✓ (1)
- 3.1.2 Not sex-linked ✓/ No (1)
This disorder occurs equally frequently in males and females ✓
The alleles do not occur on the X-chromosome ✓
This is a dominant allele and the phenotype of polydactyly will be present even in the heterozygous genotype ✓ (Any 2) (2)
(3)
- 3.1.3 (a) 2: Ff ✓
(b) 10: Ff ✓ (2)
- 3.1.4 (a) 14: unaffected female ✓
(b) 18: affected male ✓ (2)
- 3.1.6 No. ✓
Homozygous condition in the offspring is only possible if both parents have the affected allele ✓. (2)
(11)

3.2

3.2.1



Guideline for assessing the graph

CRITERION	ELABORATION	MARK
Correct type of graph	Histogram: No spaces between the bars	1
Caption for the graph	Both variables included	1
Correct label for X and Y - axes	X-axis: Age of mother Y-axis: Number of babies born with Down syndrome	1
Correct scale for X and Y - axes	X-axis: Bars must be the same width Y-axis: Suitable scale for the values	1
Plotting of points	3 to 5 bars plotted and drawn correctly	2
	Only 1 to 2 bars plotted and drawn correctly	1

(6)

- 3.2.2 The chances of having a child with Down syndrome significantly increases with the increased age of the biological mother ✓✓

OR

The chances of having a child with Down syndrome is significantly lower, the younger the biological age of the mother ✓✓

(2)

- 3.2.3 This condition occurs during meiosis in the production of egg cells/ ova/ oogenesis ✓

When chromosome pairs do not separate in Anaphase in the first meiotic division ✓

Resulting in a gamete with two copies of chromosome 21 instead of one ✓

This is called non-disjunction ✓*

The chromosomal abnormality is called Trisomy 21 ✓*

(2 x **compulsory mark** ✓* + any 2) (4)

- 3.2.4 She needs to be made aware that she has a high risk of having a baby with Down syndrome. ✓

Recommend that if she decides to go ahead with the pregnancy, she should have:

- an ultrasound of the foetus ✓
- a blood test to determine any abnormalities ✓
- an amniocentesis to check the chromosome composition/karyotype of the foetus ✓ (Any one)

Present an alternative option of adoption of a healthy child ✓ and not run the risk of having a child with Down syndrome. (Any 3) (3)

(15)

3.3

3.3.1 (a) A✓

(1)

3.3.2

Diagram A	Diagram B
1. Brow ridges less pronounced✓	1 Brow ridges more pronounced✓
2 Larger cranium/brain✓	2 Smaller cranium/brain✓
3 Jaws not prognathous✓	3 Jaw protrudes✓ (prognathous)
4 Developed chin✓	4 Chin not developed✓
5 Rounder cranium✓	5 Elongated cranium✓
6 Zygomatic arch less developed✓	6 Zygomatic arch more developed✓
7 Smaller lower jaw	7 Larger lower jaw

Rubric to assess the Table

Criterion	Mark
A comparison table is drawn with clear headings for each column	1
Any 3 corresponding differences	3 x 2
	(7)

3.3.3 *H. erectus* was the first *Homo* species✓* to move out of Africa.
Their large bodies✓and well adapted pelvic girdles✓made them better
bipedal runners and walkers✓over long distances than *H. sapiens*

(1 x **compulsory** ✓* + any 1 other) (2)

3.3.4 *Ardipithecus* ✓
Australopithecus ✓

(2)

(12)

3.4

3.4.1 Tortoise B ✓

Island X is dry and has shrub-height Cactus plants ✓

Tortoise B has a long neck ✓

which can be used to reach the cactus fruit ✓ on which it feeds

(3)

3.4.2

- The common ancestral species originated from the South American mainland ✓
- The Galapagos islands formed through volcanic activity ✓
- Some of the tortoises may have been swept out to sea during a storm ✓ / flood
- And washed ashore on 2 different islands in the Galapagos ✓
- The original population was therefore separated by the Pacific Ocean and the islands that they inhabited ✓*
- Each island has different environmental conditions ✓ / causing changes in vegetation
- Each group of tortoises underwent natural selection independently ✓
- Some tortoises that had longer necks (Group B) survived better on island X ✓ than on island Y, because they could feed on the cactus plants ✓
- While tortoises with shorter necks (Group A) survived better on island Y ✓ than island X, because they could feed on low growing grass ✓
- Each group became genotypically and phenotypically ✓ different ✓
- which might have prevented them from interbreeding ✓
- They become reproductively isolated ✓
- leading to the formation of new species ✓

(1 x **compulsory** ✓* + any 8 others) (9)**(12)****TOTAL QUESTION 3: [50]****TOTAL SECTION B: 100****GRAND TOTAL : 150**