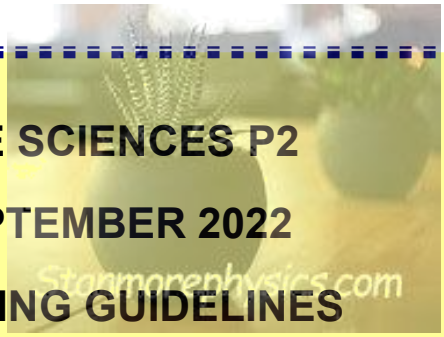
LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

NATIONAL
SENIOR CERTIFICATE

GRADE 12



LIFE SCIENCES P2
SEPTEMBER 2022
MARKING GUIDELINES

MARKS: 150

This memorandum consists of 11 pages

PRINCIPLES RELATED TO MARKING LIFE SCIENCES 2022

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 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 are incorrect, do not credit. If sequence and links becomes correct again, resume credit.

9. **Non-recognized abbreviations**
   Accept if first defined in answer. If not defined, do not credit the unrecognised 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.

Copyright reserved

15. **If units are not given in measurements**
Memorandum will allocate 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.

Copyright reserved

SECTION A
QUESTION 1

1.1	1.1.1	D✓✓		
	1.1.2	B✓✓		
	1.1.3	B✓✓		
	1.1.4	C✓✓		
	1.1.5	A✓✓		
	1.1.6	C✓✓		
	1.1.7	B✓✓		
	1.1.8	C✓✓		
	1.1.9	D✓✓		
	1.1.10	B✓✓	(10 x 2)	**(20)**

Stanmorephysics.com

1.2	1.2.1	Independent✓variable		
	1.2.2	(Law of) segregation✓		
	1.2.3	Heterozygous✓		
	1.2.4	Extinction✓		
	1.2.5	Cytokinesis✓		
	1.2.6	Foramen magnum✓		
	1.2.7	Centromere✓		
				(7)

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

1.4	1.4.1	(a) Crossing over✓	(1)
		(b) Prophase✓	(1)
	1.4.2	Y - Chiasma✓	(1)
	1.4.3	- Homologous chromosomes✓/bivalents pair up - Each chromosome has 2 chromatids✓ - Chromatids overlap/cross over✓ - Genetic material is exchanged✓between non-sister chromatids✓ - After the process of crossing-over chromosomes have genes from the homologous partner✓	
		Max	(3)
			(6)

1.5 1.5.1 This is a Dihybrid cross:
It is a cross between two individuals
with **two observed traits**✓/ coat colour and horn length
that are controlled by **two distinct genes**.✓ (2)

1.5.2 BbHh ✓ (1)

1.5.3 (a) BBHh ✓✓ (2)
(b) BBhh = black coat colour;✓ short horns ✓ (2)

1.5.4 BBHh = 4
BbHh = 4
} 8 x Black coat; Long horns

Bbhh = 4
BBhh = 4
} 8 x Black coat; Short horns

} ✓

$\frac{8}{16} \times 100$ } ✓= 50 ✓% (3)

1.5.5 (Principle of) Independent Assortment (1)
(11)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1

2.1.1 (a) Cell membrane ✓
(b) Spindle fibres✓ (2)

2.1.2 The chromosomes are of the:
- Same size✓
- Same shape✓
- Same length✓

Any (2)
(Mark first TWO only)

2.1.3 **1** - Metaphase 1✓
2 - Prophase 1✓
3 - Metaphase 2✓ (3)

2.1.4 - Crossing over ✓ (2)
- Random arrangement of chromosomes✓

(Mark first TWO only) **(9)**

2.2 **P**$_1$/parent phenotype blue eyes x brown eyes✓
genotype bb x Bb ✓

Meiosis
G/gametes b, b x B, b✓

Fertilisation
F$_1$/offspring genotype Bb, bb, Bb & bb ✓

phenotypes 2 blue eyes and 2 brown eyes✓
genotypes Bb, bb, Bb, bb✓
Parents and offspring✓/P$_1$ and F$_1$
Meiosis and fertilisation✓ **Any** (6)

OR

P$_1$/parent phenotype blue eyes x brown eyes✓
genotype bb x Bb ✓

Meiosis
Fertilisation

gametes	B	b
b	Bb	bb
b	Bb	bb

1 mark for correct gametes✓
1 mark for correct genotypes✓

F$_1$/offspring: phenotype 2 blue eyes and 2 brown eyes✓
Parents and offspring✓/P$_1$ and F$_1$
Meiosis and fertilisation✓ **Any** (6)

2.3

2.3.1
- Individual 5 is an affected male✓ and
- He must have one Y chromosome✓ and
- the recessive allele on the X chromosome✓
- which he would have inherited from his mother (individual 2) ✓
- But she does not have the disorder✓, which means it is caused by a recessive allele (5)

2.3.2 (a) 3: X^nX^n✓

(b) 4: X^NY ✓ (2)

2.3.3 0% ✓ (1)
(8)

2.4

2.4.1 Planning:
- Get permission from all stakeholders/ the learners and their parents ✓
- Decide on the sample size/ composition/ participants ✓
- Decide on the method to use to determine the blood groups/ ensure that the learners know their blood groups ✓
- Determine the apparatus and equipment needed to test for the different blood groups ✓
- Design a record sheet ✓
- Set a date/ time for the investigation ✓
- Arrange venue ✓

(Mark first TWO only) Any (2)

2.4.2 B✓ (1)

2.4.3 Represent separate/discrete/different✓ entities/blood groups /units✓

OR

Discontinuous✓ variable✓ **/** No ✓ intermediate groups✓ (2)

2.4.4 45 % ✓ /Majority of the sample group have blood group A✓

OR

10 % ✓ /Minority of the sample group have blood group B✓

OR

20 %✓ of the sample group have blood group AB✓

OR

35 %✓ of the sample group have blood group O✓ (2)

2.4.5 The sample group was very small✓/ only one group of learners from an entire school and is therefore not representative of the world population ✓ (2)
(9)

2.5

2.5.1 2 mya✓ (1)

2.5.2 1450 cm^3 – 430✓ cm^3 ╱ (1450 – 430) ✓ cm^3
= 1020✓ cm^3
(2)

2.5.3 Have better co-ordination of movement✓
Process large amount of information✓
Processing information faster✓
Development of spoken and written languages to communicate✓
(Mark first TWO only) (2)

2.5.4 Table✓ (1)

Homo sapiens	**African ape/Gorilla**
Large cranium✓	Small cranium✓
Smaller jaw✓	Bigger jaw✓
Non-prognathous✓	Prognathous✓
Smaller teeth/canines✓	Bigger teeth/canines✓
Brow ridge reduced✓/ absent	Brow ridge large✓/ pronounced
Well-developed chin✓	Less developed chin✓

(Mark first THREE only) (6)
(7)

2.5.5

- The foramen magnum✓ moved from a backwards position to a more forward position in the modern human✓
- The curvature of the spine✓changed from C-shaped to S-shaped✓
- The pelvis✓ changed from long and narrow to wider and shorter. ✓

(Mark first TWO only) (4)
(16)

2.6 2.6.1 (a) new equipment✓ is expensive
labour intensive✓
many clinical trials✓must be done/long time to produce a safe product
(Mark first ONE only) Any (1)

(b) may easily pollinate non-GM crops✓/may mate with non-GM animals✓
they might out-compete the naturally occurring organisms✓
(Mark first ONE only) Any (1)
(2)

TOTAL QUESTION 2: [50]

QUESTION 3

3.1

3.1.1
- there is variation ✓in the wolves
- in terms of their behaviour✓/ reduced aggression
- and genetics ✓/ ability to produce amylase/ digest starch
- A population of less aggressive/more tame wolves✓ were separated✓from the original wild population
- They became scavengers✓ around human settlements because they could digest the starch in human food ✓
- and were more suited for survival ✓amongst a human population
- The genes for producing more amylase were passed on to their offspring✓
- The next generation had a higher proportion of individuals with the favourable characteristic ✓

Max 6 (6)

3.1.2 (a) They can interbreed✓with different domestic dog breeds✓ to produce fertile✓ offspring (3)

(b) Humans chose desired characteristics✓ and bred dogs✓ with those phenotypes and genotypes to create dogs that suit their needs ✓/ e.g. hunters, companions, helpers. (3)
(12)

3.2

3.2.1
- Due to a mutation✓
- some bacteria are resistant to the antibiotic✓ and
- others are not✓
- There is a large degree of variation in the bacteria population✓
- When the antibiotic was first used,
- the non-resistant bacteria died ✓
- The resistant bacteria survived✓
- to reproduce✓ thereby
- increasing the population of antibiotic-resistant bacteria✓

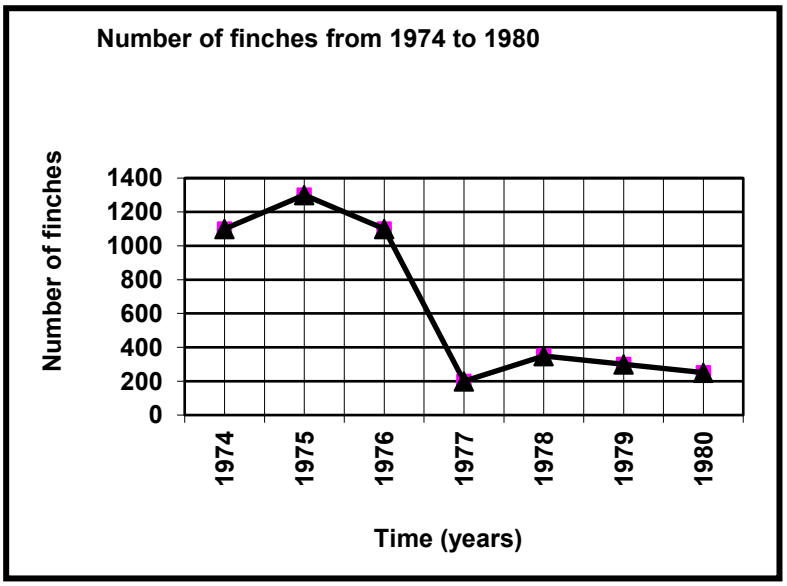
Any Max 6 (6)

3.2.2
- Overuse/ frequent use of antibiotics✓
- may lead to the development of antibiotic resistant strains of bacteria ✓/Infections caused by these bacteria are no longer affected by the antibiotic treatment
- Antibiotic resistance leads to higher medical costs, prolonged hospital stays, and increased mortality. ✓

(3)
(9)

3.3

3.3.1



Rubric for awarding marks for the graph

Correct type of graph	1
Title of graph	1
Correct label for X and Y-axes	1
Correct scale and units for X and Y-axes	1
Plotting points	1: 1 - 4 correctly plotted 2: All 7 correctly plotted

NOTE:
If the wrong type of graph is drawn: marks will be forfeited for "correct type of graph" as well as for the "joining of points".

(6)

3.3.2 1977✓

(1)

3.3.3 A drop in rainfall✓/ drought
causes a drop in seed production✓/plant growth
causing less food✓ to support fewer finches✓

(4)

3.3.4 the beaks of these finches were too small✓/ not strong enough to be able to eat the large seeds

(1)
(12)

3.4

3.4.1 (a) Molecule Y: mRNA✓
(b) Organelle V: ribosome✓
(c) Structure Z: nuclear membrane✓ (3)

3.4.2 First codon on molecule Y: AGU✓ (1)

3.4.3 R; S; P; Q (must be in correct order) ✓✓ (2)

3.4.4 Cytoplasm ✓ (1)

3.4.5 If nitrogenous base A is replaced by G, the codon will change to AGC ✓
This will code for another anticodon✓/ UCA instead of AGU
And may result in coding for another amino acid✓
which may change the protein that is formed✓ (4)

3.4.6 The double helix DNA unwinds✓
The double-stranded DNA unzips✓/ weak hydrogen bonds break to form two separate strands✓
One strand is used as a template✓
to form mRNA✓
using free RNA nucleotides from the nucleoplasm. ✓
The mRNA is complementary to the DNA. ✓
mRNA now has the coded message for protein synthesis ✓ (Any 6) (6)
(17)

TOTAL QUESTION 3: 50

GRAND TOTAL: 150

Copyright reserved