Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 12

SEPTEMBER 2023

LIFE SCIENCES P2 MARKING GUIDELINE

MARKS: **150**

This marking guideline consists of 11 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 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 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 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. 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	C ✓✓		
	1.1.3	A ✓✓		
	1.1.4	B ✓✓		
	1.1.5	D ✓✓		
	1.1.6	A ✓✓		
	1.1.7	B ✓✓		
	1.1.8	D ✓✓		
	1.1.9	A ✓✓		
	1.1.10	C ✓✓	(10 x 2)	(20)
1.2	1.2.1	Chromosomes ✓		
	1.2.2	Gene ✓		
	1.2.3	(Gregor) Mendel ✓		
	1.2.4	Peptide ✓ bond		
	1.2.5	Nucleotides ✓		
	1.2.6	Stem cells ✓		
	1.2.7	Prognathous ✓		
	1.2.8	Punctuated equilibrium ✓	(8 x 1)	(8)
1.3	1.3.1	A only ✓✓		
	1.3.2	B only ✓✓		
	1.3.3	A only ✓✓	(3 x 2)	(6)
	1.4.1	Crossing over ✓		(1)
	1.4.2	Prophase 1 ✓		(1)
	1.4.3	(a) Centromere ✓		(1)
		(b) Chromatid ✓		(1)
		(c) Homologous chromosomes ✓		(1)

1.4.4

Mark allocation

Single chromatid drawn ✓

Chromatid white/unshaded at top and shaded at bottom ✓

Correct letters (p q R S T) on chromatid ✓

(3)

1.5	1.5.1	Dihybrid cross ✓		(1)
	1.5.2	GB Gb gB gb ✓ (1–3 correct) ✓✓(all 4 correct)		(2)
	1.5.3	(a)	Grey ✓	(1)
		(b)	ggbb ✓✓	(2)
		(c)	Grey hair ✓ Black eyes ✓	(2)
				(8)

TOTAL SECTION A: 50

QUESTION 2

2.1 2.1.1 (a) DNA ✓ (1)
(b) mRNA ✓ (1)

2.1.2 Transcription ✓ (1)

2.1.3 Nucleus ✓ (1)

2.1.4 A C G ✓ G C G ✓ U G G ✓ (3)

2.1.5 Cysteine ✓ –Valine ✓ – Threonine ✓ (3)

2.1.6
- The mRNA/codon/base is GCG/C instead of GUG/U on molecule 2 ✓
- Therefore, the tRNA/anticodon will be CGC ✓ instead of CAC.
- Therefore, the amino acid will be Alanine ✓ instead of Valine
- Therefore, a different protein will be coded for. ✓ (4)

2.2 2.2.1 (a) X^n ✓ (1)
(b) $X^n X^n$ ✓✓ (2)

2.2.2
- They struggle to see clearly at night ✓
- They experience visual problems like short-sightedness ✓
- Loss of visual sharpness ✓

(Mark first TWO only) (Any 2 x 1) (2)

2.2.3 (a) Normal night vision✓ (1)
(b)
- A man/boy has only one X chromosome ✓
- The son will get his X chromosome from his mother ✓
- If the mother's X chromosomes are both for normal night vision ✓ then the boy will not have night blindness. (3)

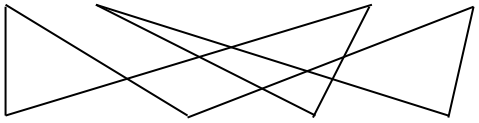
2.3 2.3.1
- **All** the black bars of the DNA profile of the child ✓
- that do not match the DNA profile of the mother ✓
- match the DNA profile of dad 2 ✓ (3)

2.3.2
- The baby carries two recessive alleles ✓/ is ii
- Dad 1 carries the allele for blood type A/ I^A and the allele for blood type B/ I^B. ✓
- Therefore, he cannot pass on the allele for blood type O ✓/ i to the child

OR

- The baby carries two recessive alleles ✓ (one from each parent)
- The mother has one recessive allele ✓
- Dad 1 has no recessive allele ✓
- Therefore, he cannot pass on the allele for blood type O/I to the child (3)

2.3.3

P_1	Phenotype	Blood type A male/dad	x	Blood type B female/mother
	Genotype	I^Ai ✓	x	I^B i ✓
Meiosis				
	G/gametes	I^A , i	x	I^B , i ✓
Fertilisation				
F_1	Genotype	I^AI^B ; I^A i ; I^Bi ; i i ✓		
	Phenotype	1 AB : 1 A : 1 B : 1O		

They have a 25**%** ✓*chance of having a child with blood group O.

OR

P_1	Phenotype	Blood type A male/dad	x	Blood type B female/mother
	Genotype	I^Ai ✓	x	I^B i ✓
Meiosis				
	G/gametes	I^A , i	x	I^B , i ✓

Fertilisation
F_1

Gametes	**I^A**	**i**
I^B	I^AI^B	I^B i
i	I^A i	ii
Correct genotypes ✓		

Phenotype 1 AB : 1 A : 1 B : 1O

They have a 25% ✓*chance of having a child with blood group O.

P_1 and F_1✓
Meiosis and fertilisation ✓ **Any 5 + *1 Compulsory** (6)

2.3.4
- Many people have the same blood groups ✓
- Therefore, blood groups can only tell us who is not the father ✓ (2)

2.3.5
- Determine the probability or causes of genetic defects
- Establish the compatibility of tissue types for organ transplants
- Identify relatives
- Identify crime suspects in forensic investigations

(Mark first TWO only) (Any 2 x 1) (2)

2.4 2.4.1 Anaphase 1 ✓ (1)

2.4.2 - Homologous chromosomes separate ✓ and move to the poles

OR

- Whole/double thread chromosomes ✓ move to the poles ✓
  (Mark first answer only) **(**Any 1 x 2) (2)

2.4.3 (a) Forms the spindle fibre ✓ (1)
(b) Pulls the chromosomes towards the poles ✓ (1)

2.4.4 Non-disjunction ✓ (1)

2.4.5 - Random arrangement ✓/ maternal and paternal chromosomes arrange randomly on the equator
- This leads to a mixture of maternal and paternal information in the gametes that form ✓

- Non-disjunction ✓/homologous chromosomes do not separate/ chromosomal mutation
- Therefore, one gamete will have an extra chromosome and the other will have one less ✓

- Crossing over ✓ has occurred
- Therefore, chromosomes have a mixture of maternal and paternal genetic information ✓

(Mark first TWO only) (Any 2 x 2) (4)

2.4.6 3 ✓ (1)
[50]

QUESTION 3

3.1 3.1.1 Artificial Selection ✓/Selective breeding (1)

3.1.2
- Shorter and wider ✓
- Pale brown fur with black stripes ✓
- Stripes only on the front of their body ✓ (Any 2 x 1) (2)

3.1.3
- If they can interbreed ✓
- and produce fertile offspring ✓ (2)

3.1.4
- Extinction of some species opens new ecological niches ✓
- which may lead to the formation of new species ✓ (2)

3.2 3.2.1 Homo naledi ✓ (1)

3.2.2 It belongs to the same genus as modern humans ✓
(Mark first ONE only) (1)

3.2.3
- *Australopithecus sediba* would be bipedal if:
- It had and S-shape spine ✓
- The hips were wider and shorter ✓
- The foramen magnum was in a forward position ✓

(Mark first THREE only) (3)

3.2.4 *Australopithecus africanus* ✓ (1)

3.2.5
- the site has produced a large number of hominin fossils ✓
- in the human linage ✓ (2)

3.2.6
- mtDNA is passed from mother to child ✓
- By following mutations in mtDNA ✓
- we can trace our female line of descent ✓
- which leads to an ancestral female who lived in East Africa about 150 000 years ago ✓ (4)

3.3 3.3.1 Biological evolution is the change in the characteristics of species over time ✓✓ (2)

3.3.2 Theory of Evolution is regarded as a scientific theory since:
- various hypotheses relate to evolution ✓
- they have been tested and verified over time ✓ (2)

3.3.3

HYPOTHESIS	THEORY
possible prediction/explanation of phenomena after observation ✓	scientific explanation of events supported by results ✓
Based on limited data ✓	It is supported by a lot of evidence ✓
Hypothesis can either be accepted or rejected ✓	Theories are reliable and the basic ideas persist in science ✓

Any 1 x 2 + Table ✓

(Mark first ONE only) (3)

3.3.4
- genetics
- biogeography
- fossils
- comparative anatomy

(Mark first TWO only) (Any 2 x 1) (2)

3.4 3.4.1 Genetic Engineering ✓/Genetic Modification (1)

3.4.2 Recombinant DNA ✓ (1)

3.4.3
- They will use less insecticide ✓
- And therefore, save money ✓
-

OR

- They will have a bigger crop yield ✓
- And therefore, earn more money ✓

(Mark first ONE only) (Any 1 x 2) (2)

3.4.4
- The gene could kill other organisms ✓
- that are useful to the environment ✓and therefore, decrease biodiversity

(Mark first ONE only) (2)

3.5 3.5.1 treatment ✓ / oral or injectable containing (1)

3.5.2 They used 200 participants ✓
(Mark first ONE only) (1)

3.5.3 100✓ – (28+12+2) ✓ **OR** 100 ✓ – 42 ✓
= 58 ✓ participants (3)

3.5.4
- They stop going to the clinic ✓*
- because they are scared of injection ✓
- because they do not have transport ✓
- because they forget ✓
- because they move away ✓

(Mark first ONE only) ✓* + Any 1 (2)

3.5.5
- Some TB bacteria have resistance to rifampicin/drugs and some do not ✓
- When rifampicin/drugs is given, ✓
- the TB bacteria with resistance to rifampicin survives ✓
- While the TB bacteria with no resistance to rifampicin dies. ✓
- The TB bacteria that survive, reproduce ✓
- and thus, pass on the allele for the resistance to rifampicin to their offspring ✓
- The next generation will therefore have a higher proportion of individuals with rifampicin/drug resistance ✓ (Any 5 x 1) (5)

3.5.6 - Patients should be
- the same age ✓
- same economic level ✓
- same health ✓ / not have other diseases

(Mark first TWO only) **Any 2** (2)

3.5.7 - To ensure that the tuberculosis bacterium is completely killed ✓
- And the TB does not reoccur ✓ (2)

[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150