



Province of the
EASTERN CAPE
EDUCATION

Iphondo leMpuma Kapa: Isebe leMfundo
Provinsie van die Oos Kaap: Departement van Onderwys
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NATIONAL SENIOR CERTIFICATE

GRADE 12

SEPTEMBER 2024

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 | D ✓✓ | | |
| | 1.1.3 | A ✓✓ | | |
| | 1.1.4 | A ✓✓ | | |
| | 1.1.5 | B ✓✓ | | |
| | 1.1.6 | C ✓✓ | | |
| | 1.1.7 | C ✓✓ | | |
| | 1.1.8 | D ✓✓ | | |
| | 1.1.9 | C ✓✓ | (9 x 2) | (18) |
| 1.2 | 1.2.1 | Karyotype ✓ | | |
| | 1.2.2 | Chloroplast ✓ | | |
| | 1.2.3 | Chiasma ✓/chiasmata | | |
| | 1.2.4 | (Blood group) O ✓ | | |
| | 1.2.5 | Locus ✓/loci | | |
| | 1.2.6 | Template ✓ | | |
| | 1.2.7 | Down syndrome ✓/trisomy 21 | | |
| | 1.2.8 | (Weak) hydrogen ✓ bonds | | |
| | 1.2.9 | Haploid ✓ | (9 x 1) | (9) |
| 1.3 | 1.3.1 | B only ✓✓ | | |
| | 1.3.2 | A only ✓✓ | | |
| | 1.3.3 | A only ✓✓ | (3 x 2) | (6) |
| | 1.4.1 | Genetic engineering ✓ | | (1) |
| | 1.4.2 | Plasmid ✓ | | (1) |
| | 1.4.3 | Enzyme ✓ | | (1) |
| | 1.4.4 | (a) Promotes skeletal and muscular growth ✓ | | (1) |
| | | (b) Produces insulin ✓ | | (1) |
| | 1.4.5 | Bacteria: | | |
| | | - Reproduce very rapidly ✓ | | |
| | | - Reproduce asexually ✓/by mitosis | | |
| | | - Exists everywhere ✓ | | |
| | | - Are simple organisms ✓ | | |
| | | - DNA is in the form of a plasmid ✓ | | |
| | | (Mark first TWO only) | | (2) |
| | 1.4.6 | Attach the gene for human growth hormone to structure X ✓/plasmid | | (1) |

1.5	1.5.1	Punctuated equilibrium ✓	(1)
	1.5.2	- (Niles) Eldredge ✓ - (Stephen) Gould ✓	(2)
	1.5.3	(a) 1 ✓ (b) 2 ✓ (c) 1 ✓	(1) (1) (1)
	1.5.4	A – organisms do not evolve/change ✓/remain the same B – organisms rapidly evolve/change ✓	(2)
	1.5.5	Biological ✓ evolution	(1)

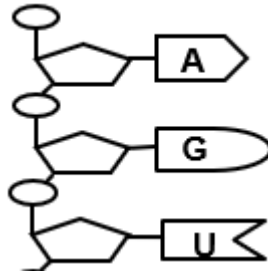
TOTAL SECTION A: 50

QUESTION 2

- 2.1 2.1.1 Prophase I ✓ (1)
- 2.1.2 (a) Centriole ✓/centrosome (1)
 (b) Homologous ✓ chromosomes (1)
 (c) Anaphase II ✓ (1)
- 2.1.3 6 ✓ (1)
- 2.1.4 DNA is made-up of:
 - deoxyribose sugar ✓
 - phosphate ✓ and
 - nitrogenous base ✓ (Any 2) (2)
- 2.1.5 - DNA replication ✓*
 - Chromosomes which were single threads become double ✓
 - each chromosome will now consist of two chromatids joined by a centromere
 - Doubling the genetic material ✓
Compulsory mark ✓* 1 + Any 2 (3)
- 2.1.6 - Part D/spindle fibre attaches to homologous chromosomes ✓
 - At the centre ✓/equator of the cell
 - Causing random arrangement ✓ of homologous chromosomes
 - Leading to further genetic variation ✓/new combinations (Any 3) (3)
- 2.2 Translation ✓*
 - Each tRNA carries a specific amino acid ✓
 - When the anticodon on the tRNA matches ✓
 - the codon on the mRNA ✓
 - then tRNA brings the required amino acid to the ribosome. ✓
 - Amino acids become attached to each other by peptide bonds. ✓
Compulsory mark ✓* 1 + Any 4 (5)
- 2.3 2.3.1 - Human embryos ✓
 - Umbilical cord ✓
 - Bone marrow ✓
 - Placental tissue ✓
 - Adult stem cells ✓
 - Teeth ✓
 - Skin ✓
 - Amniotic fluid ✓
(Mark first TWO only) (2)
- 2.3.2 Macular degeneration ✓ (1)
- 2.3.3 4 ✓/four (1)

- 2.3.4 (a) Valine ✓ (1)
- (b) - the DNA triplet will be ACG ✓ instead of ACC
 - the codon will be UGC ✓ instead of UGG
 - the amino acid will be cysteine ✓ instead of tryptophane (3)

(c) **mRNA**



Guidelines for marking the drawing.

Criteria	Mark
Correct caption (H)	1
One strand drawn (D)	1
3 nucleotides drawn in correct positions (N)	1
Correct codon / 3 correct nitrogenous bases (C)	1

(4)

- 2.4.1 - A gene ✓
 - located on chromosomes 1–22 ✓/non-sex chromosomes
 - Two copies of the mutated gene/allele cause the condition ✓ (Any 2) (2)
- 2.4.2 H ✓ (1)
- 2.4.3 - Child H inherited one recessive allele ✓/b
 - From each parent ✓ (2)
- 2.4.4 Complete ✓ dominance (1)
- 2.4.5 - K, L, M are heterozygous ✓/Bb
 - And therefore unaffected ✓ with Leigh syndrome
 - The dominant allele/B masks the expression of the recessive allele ✓/b (3)

- 2.5.1 Female ✓ with fragile X syndrome ✓ (2)
- 2.5.2 - Fragile X syndrome is caused by a dominant allele on the X-chromosome ✓/X^R
 - Both males and females need only one dominant allele ✓/X^R to be affected (2)

2.5.3 **P₁** Phenotype Male with fragile X ✓ x Female without fragile X ✓
 Genotype X^RY x X^rX^r

Meiosis
G/gametes X^R, Y x X^r, X^r ✓

Fertilisation

F₁ Genotype X^RX^r; X^RX^r; X^rY; X^rY ✓
 Phenotype 2 females with fragile X : 2 males without fragile X syndrome ✓

They have a 0% ✓*chance of having a son with fragile X syndrome.

OR

P₁ Phenotype Male with fragile X ✓ x Female without fragile X ✓
 Genotype X^RY x X^rX^r

Meiosis
G/gametes X^R, Y x X^r, X^r ✓

Fertilisation

Gametes	X ^R	Y
X ^r	X ^R X ^r	X ^r Y
X ^r	X ^R X ^r	X ^r Y
Correct genotypes ✓		

F₁ Phenotype 2 females with fragile X : 2 males without fragile X syndrome ✓

They have a 0% ✓*chance of having a son with fragile X syndrome.

P₁ and F₁ ✓
 Meiosis and fertilisation ✓

Any 6 + *1 Compulsory (7)
[50]

QUESTION 3

- 3.1 3.1.1 There are two characteristics being crossed ✓ (1)
- 3.1.2 Artificial selection ✓ / Selective breeding (1)
- 3.1.3 To obtain a desired characteristic ✓ (1)
- 3.1.4 (a) bbhh ✓✓ (2)
- (b) BH Bh Bb bh ✓(1–3 correct) ✓✓ (All 4 correct) (2)
- 3.1.5 9 : 3 : 3 : 1 ✓✓
- OR**
- 9 baby hair coat with smooth hair }
 3 baby hair coat with curly hair } ✓✓
 3 black hair coat with smooth hair }
 1 black hair coat with curly hair }
- 3.2 3.2.1 Non-existent by 2035 ✓ (1)
- 3.2.2 (a) - Habitat loss ✓
 - Overfishing of their main food sardines ✓
(Mark first TWO only) (2)
- (b) - Breeding at different times of the year ✓
 - (Species-specific) courtship behaviour ✓
(Mark first TWO only) (2)
- 3.2.3 (a) - Less sardines will be sold ✓ / decrease in profit
 - leading to unemployment ✓ / job losses
OR
 - Money will be spent on other expensive sources of protein ✓ / meat
 - Reducing spending on other food items ✓
(Mark first ONE only) (1 x 2) (2)
- (b) - More sardines/food will be available ✓
 - More African penguins will survive ✓ / not die
(Mark first ONE only) (1 x 2) (2)
- 3.3 - If a population of a single species becomes separated by a geographical barrier ✓ (sea, river, mountain, lake)
 - then the population splits into two. ✓
 - There is now no gene flow between the two populations. ✓
 - Since each population may be exposed to different environmental conditions ✓ / the selection pressure may be different
 - natural selection occurs independently ✓ in each of the two populations
 - such that the individuals of the two populations become very different from each other ✓
 - genotypically and phenotypically. ✓
 - Even if the two populations were to mix again ✓
 - they will not be able to interbreed ✓
 - The two populations are now different species. ✓ (Any 7 x 1) (7)

- 3.4 3.4.1 *Australopithecus Africanus* ✓ (1)
- 3.4.2 (a) C ✓ (1)
- (b) D ✓ (1)
- (c) A ✓ (1)
- 3.4.3 - Shape of B/pelvis is shorter and wider than that of primitive apes ✓
- and slightly taller and narrow compared to the human ✓ pelvis. (2)
- 3.4.4 - The cranium size increased ✓ in modern humans
- To allow more intelligence ✓/process more information (2)
- 3.4.5 (a) Genetic ✓/mtDNA (1)
- (b) - Fossils of *Australopithecus* were found in Africa ONLY ✓
this suggest that ancestors of homo sapiens originated in Africa ✓ (2)
- 3.5 3.5.1 To determine if the individuals who made the Laetoli footprints walked using a human-like bipedalism or a more ape-like movement (bent-knee, bent-hip). ✓ (1)
- 3.5.2 Toe depth ✓ (1)
- 3.5.3 - Obtain permission from participants. ✓
- Decide on sample size. ✓
- Decide on the measuring tool ✓/materials to be used.
- Decide on how results will be recorded. ✓
- Decide on time ✓/date to conduct the investigation
(Mark first THREE only) (3)
- 3.5.4 - Investigation was done once ✓/not repeated
- Sample size consists of 8 participants ✓ (2)
- 3.5.5 Ape-like movement ✓ (1)
- 3.5.6 $\frac{2,2}{11}$ ✓ 2 ✓ times (2)

3.5.7

TYPE OF FOOTPRINT	TOE DEPTH (cm)
Ape-like movement	6
Human-like bipedalism	2,2
Laetoli	1,1

Criteria for marking the table.

Criteria	Mark allocation
Correct table format (T) (Separation of columns)	1
Column headings (H)	1
Data entered (E) 1–2 data sets are entered correctly	1
All 3 data sets are entered correctly	2

(4)
[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150