basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P2

NOVEMBER 2023

MARKING GUIDELINE

MARKS: 150

These marking guidelines consist of 10 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. Memorandum 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 learner's 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.

19. **Changes to the memorandum**
No changes must be made to the memoranda. The provincial internal moderator must be consulted, who in turn will consult with the national internal moderator (and the Umalusi moderators where necessary).

20. **Official memoranda**
Only memoranda bearing the signatures of the national internal moderator and the Umalusi moderators and distributed by the National Department of Basic Education via the provinces must be used.

SECTION A

QUESTION 1

1.1	1.1.1	D✓✓		
	1.1.2	D✓✓		
	1.1.3	D✓✓		
	1.1.4	B✓✓		
	1.1.5	A✓✓		
	1.1.6	C✓✓		
	1.1.7	A✓✓		
	1.1.8	C✓✓		
	1.1.9	C✓✓	(9 x 2)	**(18)**
1.2	1.2.1	Locus✓		
	1.2.2	Punctuated equilibrium✓		
	1.2.3	Double helix✓		
	1.2.4	Peptide✓bond		
	1.2.5	Stereoscopic✓ / binocular vision		
	1.2.6	Incomplete✓dominance		
	1.2.7	Nucleoplasm✓		
	1.2.8	Chromatin network✓		
	1.2.9	Cytokinesis✓		
	1.2.10	Gonosomes✓	(10 x 1)	**(10)**
1.3	1.3.1	None✓✓		
	1.3.2	Both A and B✓✓		
	1.3.3	Both A and B✓✓	(3 x 2)	**(6)**
1.4	1.4.1	Pedigree✓diagram		(1)
	1.4.2	3✓/Three		(1)
	1.4.3	3✓/Three		(1)
	1.4.4	$\left.\begin{array}{l} I^{A}i \\ I^{B}i \\ ii \end{array}\right]$ ✓✓		(2)
	1.4.5	ii✓		(1)
	1.4.6	Ann✓✓		(2)
				(8)
1.5	1.5.1	(a) Transcription✓		(1)
		(b) mRNA✓/messenger RNA		(1)
		(c) Ribosome✓		(1)
	1.5.2	Anticodon✓		(1)
	1.5.3	AGT✓		(1)
	1.5.4	1✓		(1)
	1.5.5	4✓		(1)
	1.5.6	Ribose✓		(1)
				(8)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 2.1.1 (a) Centriole✓/centrosome (1)

(b) Spindle fibre✓ (1)

2.1.2 Prophase I✓ (1)

2.1.3
- Pairing of homologous chromosomes is visible✓/ bivalents are visible
- Development of spindle fibres✓
- Crossing over is taking place✓
- Centriole/ centrosome moved to opposite poles✓
- Disintegration of the nuclear membrane✓ Any (3)

(Mark first THREE only)

2.1.4
- Parts of the homologous chromosomes overlap✓ and
- DNA/genetic material is exchanged✓
- at points called chiasmata✓/chiasma (3)

2.1.5 (a) Metaphase I✓ (1)

(b)
- In Metaphase I/Meiosis I chromosomes are arranged in pairs at the equator✓
- In mitosis the chromosomes are arranged singly at the equator✓ (2)

2.1.6
- Four (daughter) cells will be formed✓of which
- two will each have five chromosomes✓ and
- the other two will each have three chromosomes✓ (3)

(15)

2.2
- The (DNA) double helix unwinds✓and
- unzips✓/hydrogen bonds break
- to form two separate strands✓
- Both (DNA) strands serve as templates✓
- to build a complementary (DNA) strand✓/ A pairs with T and C pairs with G
- using free (DNA) nucleotides✓ from the nucleoplasm
- This results in two identical (DNA) molecules✓ Any **(6)**

2.3 2.3.1 The presence of T✓/thymine in the original sequence (1)

2.3.2 489✓✓ (2)

2.3.3
- A form of a gene✓
- that is carried on chromosome 1 to 22✓ and
- is always expressed in the phenotype✓ of an individual
- in the heterozygous✓ condition Any (3)

2.3.4 (a)
- The codon changed from GAC to GUC✓
- resulting in amino acid Leu replaced by Gln✓
- The other codon changed from AUA to AGA✓
- resulting in amino acid Try replaced by Arg✓
- This changed the sequence of amino acids✓
- A different protein was formed✓ Any (5)

(b)
- Harmful✓ effect
- The blood clot is not broken down✓
- Leading to blockage of arteries✓ /oxygen and nutrients are not transported to cells (3)

(14)

2.4 **P_1** Phenotype With polydactyly x Without polydactyly✓
Genotype Rr x rr✓

Meiosis

G/gametes R , r x r, r✓

Fertilisation

F_1 Genotype Rr, Rr, rr, rr✓

Phenotype 2 polydactyly ; 2 without polydactyly✓

50✓*% chance of polydactyl child

P_1 and F_1✓
Meiosis and fertilisation✓

***1 compulsory mark** + Any 5

OR

P_1 Phenotype With polydactyly x Without polydactyly✓
Genotype Rr x rr✓

Meiosis

Fertilisation

Gametes	R	r
r	Rr	rr
r	Rr	rr

1 mark for correct gametes
1 mark for correct genotypes

F_1 Phenotype 2 polydactyly ; 2 without polydactyly✓

50✓*% chance of polydactyl child

P_1 and F_1✓
Meiosis and fertilisation✓

***1 compulsory mark** + Any 5 **(6)**

2.5 2.5.1 (a) BBDD✓
bbdd✓ (2)

(b) White, round fruit✓✓ (2)

2.5.2 (a) BD
bD ✓✓
Bd
bd (2)

(b) One✓/1 (1)

2.5.3 BBdd and BBdd✓✓

OR

BBdd and Bbdd✓✓

OR

BBdd and bbdd✓✓ (2)
(9)
[50]

QUESTION 3

3.1 3.1.1
- The farmer interbred✓
- mealie plants with a high protein content✓
- over 50/many generations✓ (3)

3.1.2 12,8✓ % (Accept 12,7 - 12,9%) (1)

3.1.3 $\frac{20}{14}$✓ = 1,43✓ times (2)

3.1.4
- Artificial selection: organisms with a desired characteristic are interbred✓
- Genetic engineering: genes coding for the desired characteristic are inserted into an organism✓ (2)

(Mark first ONE only) **(8)**

3.2
- There is variation amongst the offspring in a population✓
- Some have favourable characteristics and some do not✓
- When there is a change in the environmental conditions✓/there is competition
- organisms with a favourable characteristic survive✓
- whilst organisms with an unfavourable characteristic die✓
- The organisms that survive, reproduce✓
- and pass on the allele for the favourable characteristic to their offspring✓
- The next generation will therefore have a higher proportion of individuals with the favourable characteristic✓ Any **(7)**

3.3	3.3.1	(a) Height of the head✓	(1)
		(b) Bite force✓	(1)
	3.3.2	- Similar characteristics✓ - (Same) reproductive age✓ - (Same) measuring tool/ for bite force✓/ Kistler force used to measure bite force - Each species kept in environmental conditions similar to their habitats✓ - Lizards of the same species in each group✓ Any **(Mark first TWO only)**	(2)
	3.3.3	Five measurements of the bite force✓ **(Mark first ONE only)**	(1)
	3.3.4	Continuous✓ variation	(1)
	3.3.5	Lizards with an increased head height have a stronger bite force✓✓ **OR** Lizards with a decreased head height have a weaker bite force✓✓	(2)
	3.3.6	C✓	(1)
	3.3.7	- Has the strongest bite force✓/20,4 N - to break down✓ tough fibrous plant material	(2)
	3.3.8	A✓	(1) **(12)**
3.4	3.4.1	*H. erectus*✓	(1)
	3.4.2	3,2 – 2,7✓ = 0,5✓ my	(2)
	3.4.3	*H. habilis*✓	(1)
	3.4.4	- Scraping✓ - Pounding✓ - Chopping✓ Any **(Mark first TWO only)**	(2)
	3.4.5	- *H. sapiens*✓ - *H. neanderthalensis*✓ **(Mark first TWO only)**	(2)
	3.4.6	- Increased brain size✓led to - increased intelligence✓ leading to - the development of complex tools✓	(3) **(11)**

3.5	3.5.1	*Australopithecus*✓	(1)
	3.5.2	S✓-shaped spine	(1)
	3.5.3	- An organism that has intermediate/common characteristics✓ - between two genera✓/species	(2)
	3.5.4	A✓	(1)
	3.5.5	- **A** has a pelvis that is intermediate✓/ transitional between **B** and **C**✓ **OR** - **A** has a shorter and wider pelvis than **B**✓ but not as short and wide as **C**✓ **OR** - **A** has a longer and narrower pelvis than **C** ✓ but not as long and narrow as **B**✓	(2)
	3.5.6	- *A. sediba* was prognathous✓/ more prognathous while - *H. sapiens* are non-prognathous✓/ less prognathous - This is due to a smaller jaw✓ - with smaller teeth✓ and - reduced chewing muscles✓ - caused by a changed diet to eating soft/cooked food✓ Any	(5) **(12)** **[50]**

TOTAL SECTION B: 100

GRAND TOTAL: 150