basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P2

NOVEMBER 2022

MARKING GUIDELINES

MARKS: 150

These marking guidelines consist 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 guidelines 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 marking guidelines**
    No changes must be made to the marking guidelines. 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 marking guidelines**
    Only marking guidelines 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	B✓✓		
	1.1.2	B✓✓		
	1.1.3	A✓✓		
	1.1.4	C✓✓		
	1.1.5	C✓✓		
	1.1.6	A✓✓		
	1.1.7	B✓✓		
	1.1.8	D✓✓		
	1.1.9	B✓✓	(9 x 2)	**(18)**
1.2	1.2.1	(Biological) evolution✓		
	1.2.2	Hydrogen✓bonds		
	1.2.3	Centromere✓		
	1.2.4	Cytokinesis✓		
	1.2.5	Crossing over✓		
	1.2.6	Centrosomes✓/Centrioles		
	1.2.7	Homologous✓structures		
	1.2.8	Interphase✓		
	1.2.9	Ribosome✓	(9 x 1)	**(9)**
1.3	1.3.1	B only✓✓		
	1.3.2	A only✓✓		
	1.3.3	B only✓✓	(3 x 2)	**(6)**
1.4	1.4.1	3✓/Three		(1)
	1.4.2	(a) H✓		(1)
		(b) Rr✓		(1)
		(c) C✓and F✓		(2) **(5)**

1.5	1.5.1	5✓/Five		(1)
	1.5.2	Gonosomes✓/Sex chromosomes		(1)
	1.5.3	(a)	Down syndrome✓/Trisomy 21	(1)
		(b)	Non-disjunction✓	(1)
	1.5.4	Male✓		(1) **(5)**
1.6	1.6.1	Dihybrid✓cross		(1)
	1.6.2	(a)	Brown✓ fur and long ears✓	(2)
		(b)	bbee✓✓	(2)
		(c)	Be✓ be✓	(2) **(7)**

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 2.1.1 Nucleus✓/nucleoplasm (1)

2.1.2 (a) Deoxyribose✓ (1)

(b) Uracil✓/U (1)

2.1.3

Transcription	DNA replication
Only one strand acts as a template✓	Both strands act as templates✓
(Free) RNA nucleotides✓ are complementary	(Free) DNA nucleotides✓ are complementary
Adenine complements uracil✓/(A complements U)	Adenine pairs with thymine✓/ (A pairs with T)
A mRNA molecule is formed✓	Two identical DNA molecules are formed✓
Only a short section of DNA✓ is used	The whole DNA molecule✓ is used
DNA unwinds and unzips partially✓	DNA unwinds and unzips completely✓

(Mark first TWO only) 1 mark for table + (Any 2 x 2) (5)
(8)

2.2 2.2.1 Gene✓ mutation (1)

2.2.2 - There is a change in the sequence (of nitrogenous bases) from CCG to CUG✓ (1)

2.2.3 (a) 5✓/Five (1)

(b) UAU✓ (1)

(c)
- The codon CCG changed to CUG✓/ 4th codon has changed
- The anticodon/tRNA sequence changed✓
- The amino acid proline✓
- was replaced by leucine✓
- This resulted in a different protein✓/no protein being formed

Any (4)
(8)

2.3	2.3.1	(a) 20✓	(1)
		(b) 50✓	(1)
	2.3.2	- A sperm cell is a gamete✓ - formed by meiosis✓ - and must be haploid✓ - to overcome the doubling effect of fertilisation✓	(4)
	2.3.3	- Anaphase I✓	(1)
	2.3.4	- Spindle fibres shorten✓/contract - Chromosome pairs separate✓and - move to the opposite poles✓	(3) **(10)**
2.4	2.4.1	954 000✓	(1)
	2.4.2	1 800 000✓ – (954 000 + 180 000 + 54 000)✓ = 612 000✓people **OR** 1 800 000✓ - 1 188 000✓ = 612 000✓people **OR** $\frac{34}{100}$ ✓ x 1 800 000✓ = 612 000✓people	(3)
	2.4.3	- The allele for blood group A/ I^A is inherited from one parent✓ and - the allele for blood group B/ I^B is inherited from the other parent✓ therefore - the child has blood group AB✓/genotype I^AI^B	(3) **(7)**
2.5	2.5.1	Heila✓ and Leo✓ **(Mark first TWO only)**	(2)
	2.5.2	- All of the (DNA) bands from Heila and Leo✓ - match with the (DNA) bands of the mother and the father✓ **OR** - None of the (DNA) bands from Priya✓ - match with the (DNA) bands of the mother and the father✓	(2)

2.5.3
- Tracing missing persons✓
- Identification of genetic disorders✓
- Identification of suspects in a crime✓
- Matching tissues for organ transplants✓
- Identifying dead persons✓ Any (3)

(Mark first THREE only) **(7)**

2.6 2.6.1
- Males have only one X chromosome✓/The Y-chromosome does not have this allele and
- have to inherit only one recessive allele✓ to have white teeth
- whereas females have two X chromosomes✓ and have to
- inherit two recessive alleles to have white teeth✓ (4)

2.6.2

P_1	Phenotype	Male with brown teeth	x	Female with white teeth✓
	Genotype	X^BY	x	X^bX^b✓
Meiosis				
	G/gametes	X^B, Y	x	X^b, X^b✓
Fertilisation				
F_1	Genotype	X^BX^b, X^BX^b,		X^bY, X^bY✓
	Phenotype	1 female with brown teeth: 1 male with white teeth✓*		

P_1 and F_1✓
Meiosis and fertilisation✓

***1 compulsory mark** + Any 5

OR

P_1	Phenotype	Male with brown teeth	x	Female with white teeth✓
	Genotype	X^BY	x	X^bX^b✓

Meiosis

Fertilisation

Gametes	X^B	Y
X^b	X^BX^b	X^bY
X^b	X^BX^b	X^bY

1 mark for correct gametes
1 mark for correct genotypes

F_1 Phenotype 1 female with brown teeth: 1 male with white teeth✓*

P_1 and F_1✓
Meiosis and fertilisation✓

***1 compulsory mark** + Any 5 (6)
(10)
[50]

QUESTION 3

3.1 3.1.1
- Embryos✓
- Umbilical cord✓
- Bone marrow✓ (3)

(Mark first THREE only)

3.1.2
- Stem cells are undifferentiated✓
- and have the potential to develop into any type of cell✓
- to replace affected/defective cells✓ causing a disorder Any (2)

3.1.3
- Heart disease✓
- Spinal injuries✓ Any (1)

(Mark first ONE only) **(6)**

3.2 3.2.1
- A group of organisms of the same species✓
- occupying the same habitat✓
- at the same time✓ (3)

3.2.2 They produce infertile offspring✓ (1)
(Mark first ONE only)

3.2.3
- Breeding at different times of the year✓
- Species-specific courtship behaviour✓
- Adaptation to different pollinators✓
- Prevention of fertilisation✓ Any (3)

(Mark first THREE only) **(7)**

3.3 3.3.1
- To show a possible common ancestor✓
- To identify trends in evolution✓ Any (1)

3.3.2
- Both have opposable thumbs✓
- to allow for a power grip✓/precision grip/ any example thereof (2)

3.3.3
- Humans have small teeth✓/canines whereas African apes have large teeth✓/canines
- There are no gaps✓/diastema between the teeth in humans whereas African apes have gaps✓ /diastema between the teeth

(Mark first ONE only (Any 1 x 2) (2)
(5)

3.4 3.4.1 Phylogenetic tree✓/cladogram (1)

3.4.2 2✓/Two (1)

3.4.3 (a) *Homo habilis*✓ (1)

(b) *(Homo) naledi*✓ (1)

3.4.4 *(Homo) sapiens*✓ (1)

3.4.5
- Fossil✓evidence
- Cultural✓ evidence
- Genetic✓ evidence Any (2)

(Mark first TWO only)

3.4.6
- *A* large cranial capacity✓ in *Homo sapiens*
- indicates a larger brain✓
- leading to greater intelligence✓

OR

- A small cranial capacity✓in *Australopithecus africanus*
- indicates a smaller brain✓
- leading to lower intelligence✓ (3)

3.4.7
- Fossils *of Australopithecus spp*. were found in Africa only✓ and
- fossils of s*pecies **X***/*Homo habilis* were found in Africa only✓
- The oldest fossils of *Homo erectus* were found in Africa✓ /the younger fossils were found elsewhere
- indicating that modern humans originated in Africa and migrated out of Africa✓ (4)

(14)

3.5 3.5.1 *Ambulocetus*✓ (1)

3.5.2 It had flipper-like large feet and a tail✓✓ (2)
(Mark first ONE only)

3.5.3
- They share characteristics✓/have intermediate characteristics
- of the ancestor/*Pakicetus* <u>and</u> the present-day species✓/ *Balaena*

OR

- They have legs like *Pakicetus*✓ and
- flippers of the present day *Balaena*✓ (2)
-

3.5.4
- Ancestral species of whales all had legs✓/lived on land
- As more time was spent in the water✓in search of food
- the legs were used less✓ and disappeared
- the acquired characteristic was passed on to the next generation✓ Any (3)

(8)

3.6 3.6.1 (a) Probability of developing resistance✓to antiretroviral drugs (1)

(b) Number of missed treatments✓ (1)

3.6.2 Treatment must not be missed✓ (1)

3.6.3 The probability of HIV developing resistance to antiretroviral drugs increases with the increase in the number of missed treatments✓✓

OR

The more the days of missed treatment, the greater the probability of the virus developing resistance to antiretroviral drugs✓✓ (2)

3.6.4
- There is variation in the resistance✓ of the HI virus to antiretroviral drugs
- Some viruses are resistant✓ to the drugs and
- others are not resistant✓
- Those that are not resistant do not survive✓
- When treatments are missed✓,
- the resistant viruses survive and reproduce✓
- passing the resistance to their offspring✓ Any (5)

(10)
[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150