basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P2

NOVEMBER 2019

MARKING GUIDELINES

MARKS: 150

These marking guidelines consist of 12 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	C✓✓		
	1.1.2	C ✓✓		
	1.1.3	C ✓✓		
	1.1.4	B✓✓		
	1.1.5	A ✓✓		
	1.1.6	A ✓✓		
	1.1.7	C✓✓		
	1.1.8	C✓✓		
	1.1.9	B✓✓	(9 x 2)	**(18)**
1.2	1.2.1	Uracil✓		
	1.2.2	Punctuated equilibrium✓		
	1.2.3	Extinction✓		
	1.2.4	*Australopithecus*✓		
	1.2.5	Ribosome✓		
	1.2.6	Locus✓		
	1.2.7	Ribose✓		
	1.2.8	Biotechnology✓	(8 x 1)	**(8)**
1.3	1.3.1	Both A and B✓✓		
	1.3.2	None✓✓		
	1.3.3	B only✓✓	(3 x 2)	**(6)**
1.4	1.4.1	(a) Centriole✓/centrosome		(1)
		(b) Chromosome✓		(1)
		(c) Cell membrane✓/plasma membrane/plasmalemma		(1)
	1.4.2	(a) 2✓- Metaphase **II**✓		(2)
		(b) 4✓- Prophase **I**✓		(2)
		(c) 1✓- Anaphase **I**✓		(2)
	1.4.3	(a) 2✓/ 3 and 1		(1)
		(b) 23✓		(1)
		(c) 46✓		(1)
				(12)
1.5	1.5.1	2✓		(1)
	1.5.2	- Normal leaf✓/normal shape - One seed✓ per pod		(2)
	1.5.3	(a) PpLl✓✓ **OR** PpLl✓ x PpLl✓ /PpLl✓ ; PpLl✓		(2)
		(b) 32✓		(1)
				(6)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 2.1.1 (a) tRNA✓/transfer RNA (1)

(b) Anticodon✓ (1)

2.1.2 (a) UGG✓✓ (in correct order) (2)

(b) TGG✓✓ (in correct order) (2)
(6)

2.2
- The double helix DNA unwinds✓and
- 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✓
- The coded message for protein synthesis is thus copied onto mRNA✓ Any 6 **(6)**

2.3 2.3.1 Co-dominance✓

- The phenotypes/alleles of the parents are equally dominant✓ (orange and yellow)
- and are both expressed in the phenotype of the offspring✓ (3)

2.3.2 Black✓ (1)

2.3.3
- In cross 1 both parents are yellow✓/none of the parents are black
- but black appears in the phenotype of the offspring✓

OR
- In cross 3 both parents are orange✓/ none of the parents are black
- but black appears in the phenotype of the offspring✓

OR
- The ratio of the offspring in cross 1 (yellow and yellow)/cross 3 (orange and orange) is 3 yellow/orange :1 black✓
- The smaller proportion represents the recessive allele/black✓ (2)
(6)

2.4 2.4.1 Spotted✓back (1)

2.4.2 Spotted frogs produced offspring without spots✓✓

OR

The spotted offspring were three times more than offspring without spots✓✓ / ratio of spotted offspring to offspring without spots is 3:1 (2)

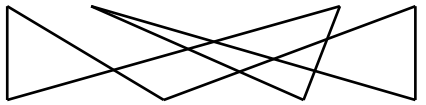
2.4.3

P_1	Phenotype	Spotted	x	No spots✓
	Genotype	Dd	x	dd✓

Meiosis

G/gametes D , d x d , d ✓

Fertilisation



F_1 Genotype Dd ; Dd : dd ; dd✓*

Phenotype (2) spotted : (2) without spots✓*

P_1 and F_1✓

Meiosis and fertilisation✓ **2 Compulsory** + Any 4 others

OR

P_1	Phenotype	Spotted	x	No spots✓
	Genotype	Dd	x	dd✓

Meiosis

Fertilisation

Gametes	D	d
d	Dd	dd
d	Dd	dd

1 mark for correct gametes
1 mark for correct genotypes*

F_1 Phenotype (2) spotted : (2) without spots✓*

P_1 and F_1✓

Meiosis and fertilisation✓ **2 Compulsory** + Any 4 others (6)
(9)

2.5 2.5.1 Type of antibiotic✓ (1)

2.5.2 Same:

- Environmental conditions✓/example

- Amount of antibiotic✓
- Concentration of antibiotic✓
- Time of initial injection of antibiotics✓

- Age of the piglets✓
- Species of piglets✓
- Type food given to piglets✓
- Amount of food given to piglets✓
- Size/mass of piglets✓

- Size of petri dishes✓
- Growth medium in both sets of petri dishes✓
- Sample size of *E. coli* ✓
- Method of measurement✓
- Person doing the measurements✓
- Time interval for measurements✓

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

2.5.3
- Investigation was done over a period of six months✓
- Took many measurements✓/calculated the average resistance
- Used a large sample size✓/100 piglets Any 2 (2)

(Mark the first TWO only)

2.5.4 Antibiotic **B**✓ (1)

2.5.5
- The average percentage resistance of *E.coli* to antibiotic **B** is lower✓ than its resistance to antibiotic **A** therefore
- more *E. coli* bacteria die in the presence of antibiotic **B**✓ (2)

2.5.6
- There was variation✓ in the population of *E. coli* bacteria
- Some were resistant to antibiotic **A**✓
- others were not resistant✓
- Those *E. coli* bacteria which were not resistant to antibiotic **A** were killed✓
- Those which were resistant to antibiotic **A** survive✓/reproduced
- passing on the alleles for resistance to their offspring✓
- Over time, the resistance to antibiotic **A** increased✓/the percentage of *E. coli* bacteria dying decreased Any 5 (5)

(13)
[40]

QUESTION 3

3.1 3.1.1

Skull 1	Skull 2
Brow ridges pronounced✓	Brow ridges less pronounced✓
More protruding jaws✓/prognathous	Less protruding jaws✓/non-prognathous
Larger jaws✓	Smaller jaws✓
Smaller cranium size✓	Larger cranium size✓
Larger teeth✓/ canines	Smaller teeth✓/canines
Poorly developed chin✓	Well developed chin✓
Sloping face✓	Flat face✓

(Mark first THREE only) Table 1 + (3 x 2) (7)

3.1.2
- Freely rotating arms✓
- Long upper arms✓
- Rotation around elbow joints✓
- Rotation around the wrists✓
- Opposable thumbs✓
- Bare fingertips✓/ nails instead of claws
- Five fingers✓/pentadactyl limb
- Fingerprints present✓

Any 4 (4)
(Mark first FOUR only)

3.1.3
- Since the cranium houses the brain✓
- a large cranial volume indicates a larger brain✓/more brain cells
- which suggests greater intelligence✓ (3)

(14)

3.2 3.2.1 Walking on two legs✓✓ (2)

3.2.2 (a)
- Foramen magnum moved to a more forward position✓
- to allow the spinal cord to enter vertically✓ (2)

(b)
- Pelvic girdle is short and wide✓/broad (2)
- to support the upper body✓

(c)
- Spine is more curved✓/S shaped (2)
- to absorb shock✓/allow flexible movement/support **(8)**

3.3
- A population of a particular species becomes separated✓
- by a geographical barrier✓
- There is no gene flow between the separated populations✓
- Natural selection occurs independently in each population✓
- due to exposure to different environmental conditions✓/selection pressures
- The populations become very different✓from each other
- genotypically and phenotypically✓
- Even if the populations were to mix again✓
- they will not be able to interbreed✓
- The different populations are now new species✓ Any 6 **(6)**

3.4 3.4.1
- Crossing over✓
- Random arrangement of chromosomes✓ } meiosis✓
- Random mating✓
- Random fertilisation✓
- Chromosomal mutation✓

(Mark first THREE only) (3)

3.4.2 (a) Mutant gene✓/Inherited from their ancestors (1)

(b) Influenced by altitude✓ /level of oxygen (1)

3.4.3
- More haemoglobin present✓
- to allow for maximum absorption of the available oxygen✓

OR
- More oxygen will be available✓
- to meet their energy needs✓ (2)

3.4.4
- Originally the amount of red blood cells was similar in all humans✓/the Tibetans did not produce a large number of red blood cells
- As a result of the low oxygen content at high altitudes✓
- the red blood cells tried to increase the amount of oxygen absorbed✓
- As a result ancestral Tibetans produced more red blood cells✓/developed ways of using oxygen more efficiently
- to increase the availability of oxygen to the body✓
- This acquired characteristic✓
- was then passed on to their offspring✓
- All Tibetans now produce more red blood cells✓/use oxygen more efficiently to survive at high altitudes Any (5)

(12)
[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

Sex determination (S)
- Females have XX chromosomes✓
- thus produce an ovum which will always carry the X chromosome✓
- Males have XY chromosomes✓
- thus a sperm will either carry X✓
- or Y✓ chromosome
- If a sperm carrying the X chromosome fertilises the ovum carrying the X chromosome✓
- then a female child results✓
- If a sperm carrying the Y chromosome fertilises the ovum carrying the X chromosome✓
- then a male child results✓
- Therefore it is the father's gamete carrying X or Y chromosome that determines the sex of the child✓
- There is a 50% chance that the child can be a boy or a girl✓ Any 7 (7)

Blood grouping (B)
- The blood group of a child is determined by the alleles received from both parents✓
- The blood group of the mother, the child and the possible father is determined✓
- If the blood group of the mother and possible father cannot lead to the blood group of the child✓
- the man is not the father✓
- If the blood group of the mother and the possible father can lead to the blood group of the child✓
- the man might be the father✓
- This is not conclusive✓
- because many men have the same blood group✓ Any 5 (5)

DNA profiling (P)

- A child received DNA from both parents✓
- The DNA profiles of the mother, child and the possible father are determined✓
- A comparison of the DNA bands of the mother and the child is made✓
- The remaining DNA bands are compared to the possible father's DNA bands✓
- If all the remaining DNA bands in the child's profile match the possible father's DNA bands✓
- then the possible father is the biological father✓
- If all the remaining DNA bands in the child's profile does not match the possible father's DNA bands✓
- then the possible father is not the biological father✓ Any 5 (5)

Content: (17**)**
Synthesis: (3)
(20)

ASSESSING THE PRESENTATION OF THE ESSAY

Criterion	Relevance (R)	Logical sequence (L)	Comprehensive (C)
Generally	All information provided is relevant to the topic	Ideas are arranged in a logical/cause-effect sequence	All aspects required by the essay have been sufficiently addressed
In this essay in Q4	Only information relevant to: - Sex determination - Blood grouping and paternity - DNA profiling and paternity is given There is no irrelevant information.	The description for each of: - Sex determination - Blood grouping and paternity - DNA profiling and paternity is logical and sequential.	At least the following are provided: - Sex determination **S** (**5/7**) - Blood grouping and paternity **B** (**3/5**) - DNA profiling and paternity **P** (**3/5**)
Mark	1	1	1

TOTAL SECTION C: 20
GRAND TOTAL: 150