basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS/
NATIONAL SENIOR CERTIFICATE EXAMINATIONS

LIFE SCIENCES P2

2019

MARKING GUIDELINES

Final – 04 June 2019

MARKS: 150

These marking guidelines consist of 13 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	D✓✓		
	1.1.2	A✓✓		
	1.1.3	B✓✓		
	1.1.4	B✓✓		
	1.1.5	D✓✓		
	1.1.6	C✓✓		
	1.1.7	C✓✓		
	1.1.8	B✓✓	(8 x 2)	**(16)**
1.2	1.2.1	DNA profiling✓		
	1.2.2	Ribose✓		
	1.2.3	Centriole✓/centrosome		
	1.2.4	Stem✓cells		
	1.2.5	Cytokinesis✓		
	1.2.6	Phylogenetic tree✓/cladogram	(6 x 1)	**(6)**
1.3	1.3.1	B only✓✓		
	1.3.2	B only✓✓		
	1.3.3	A only✓✓	(3 x 2)	**(6)**
1.4	1.4.1	Cytosine✓		(1)
	1.4.2	20✓✓%		(2)
	1.4.3	G A A✓ U G U✓		(2)
	1.4.4	Glutamic acid✓ - Cysteine✓ (in that order)		(2)
	1.4.5	UAC✓		(1) **(8)**
1.5	1.5.1	(a) Down syndrome✓/ Trisomy 21		(1)
		(b) Anaphase✓ **I/ II**		(1)
		(c) Chromosomal✓ mutation		(1)
	1.5.2	Autosomes✓		(1) **(4)**

1.6	1.6.1	(a) - *Sahelanthropus*✓ - *Australopithecus*✓ - *Homo*✓ **(Mark first TWO only)**	Any 2	(2)
		(b) - Taung child✓ - Mrs Ples✓ - (Little foot)✓ **(Mark first TWO only)**	Any 2	(2)
		(c) *Sahelanthropus*✓		(1)
	1.6.2	*Homo neanderthalensis*✓		(1)
	1.6.3	650✓cm^3		(1)
	1.6.4	2,0 mya✓/2 000 000 years ago		(1)
	1.6.5	Genetic✓ evidence Cultural✓ evidence **(Mark first TWO only)**		(2) **(10)**

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 2.1.1 B – Nitrogenous base✓
C – Phosphate✓ (2)

2.1.2 (a) Nucleotide✓ (1)

(b) - (James) Watson✓
- (Francis) Crick✓
- (Maurice) Wilkins✓ Any 2 (2)

(Mark first TWO only)

(c) Nucleus✓/ Mitochondrion/ Chloroplast Any 1 (1)

(Mark first ONE only)

2.1.3
- The DNA code will change✓
- leading to different mRNA✓/codons
- which will match with different tRNA✓/anticodons
- resulting in different amino acids✓ being brought to the ribosome leading to a different protein (4)

2.1.4

Monomer of RNA	Monomer of DNA
Contains the sugar ribose✓	Contains the sugar deoxyribose✓
Contains the nitrogenous base uracil✓	Contains the nitrogenous base thymine✓

(Mark first TWO only) ✓ table (5)
(15)

2.2 2.2.1 2✓ (1)

2.2.2
- For **A** to be without PKD, it has to be homozygous recessive✓/hh
- **A** would therefore receive a recessive allele from each parent✓
- Each parent has PKD✓
- hence each parent has one dominant allele✓/H/genotype Hh

OR

- Each parent has PKD✓
- If the parents were homozygous✓
- then all the offspring would have PKD✓
- and there would be no possibility of genotype at **A**✓/offspring without PKD/homozygous recessive (4)

(5)

2.3 2.3.1 Organisms that are able to interbreed and produce fertile offspring✓✓ (2)

2.3.2 Anthers✓
Ovary✓/ Ovule (2)
(Mark first TWO only)

2.3.3 (a) 9✓ (1)

(b) 36✓ (1)

2.3.4
- The spindle fibres contract✓
- The centromere of each chromosome splits into two✓
- The chromatids move to opposite poles✓ (3)

2.3.5
- Fewer crops will be destroyed by insects and diseases✓ which
- will increase the crop yield✓/food security/ decrease expenses on pesticides (2)

(11)

2.4 2.4.1
- Incomplete dominance*****✓
- Neither of the alleles are dominant✓/neither E nor S is dominant
- leading to an intermediate phenotype✓/offspring with medium fins

1 compulsory***** + 2 (3)

2.4.2

P_1	Phenotype	Medium fins	x	Medium fins✓
	Genotype	ES	x	ES✓

Meiosis

Fertilisation

Gametes	E	S
E	EE	ES
S	ES	SS

1 mark for correct gametes
1 mark for correct genotypes

F_1 Phenotype 25% short fins✓*; ***Compulsory**
50% medium fins; 25% elongated fins

P_1 and F_1✓
Meiosis and fertilisation✓ 1 Compulsory + Any 5

OR

P_1	Phenotype	Medium fins	x	Medium fins✓
	Genotype	ES	x	ES✓

Meiosis

G/gametes E S x E S✓

Fertilisation

F_1 Genotype EE; ES; ES SS✓

Phenotype 25% short fins✓*; ***Compulsory**
50% medium fins; 25% elongated fins

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

(9)
[40]

QUESTION 3

3.1 3.1.1
- The mating call can be easily heard✓/can be heard over a distance
- to ensure that a mate is attracted✓ (2)

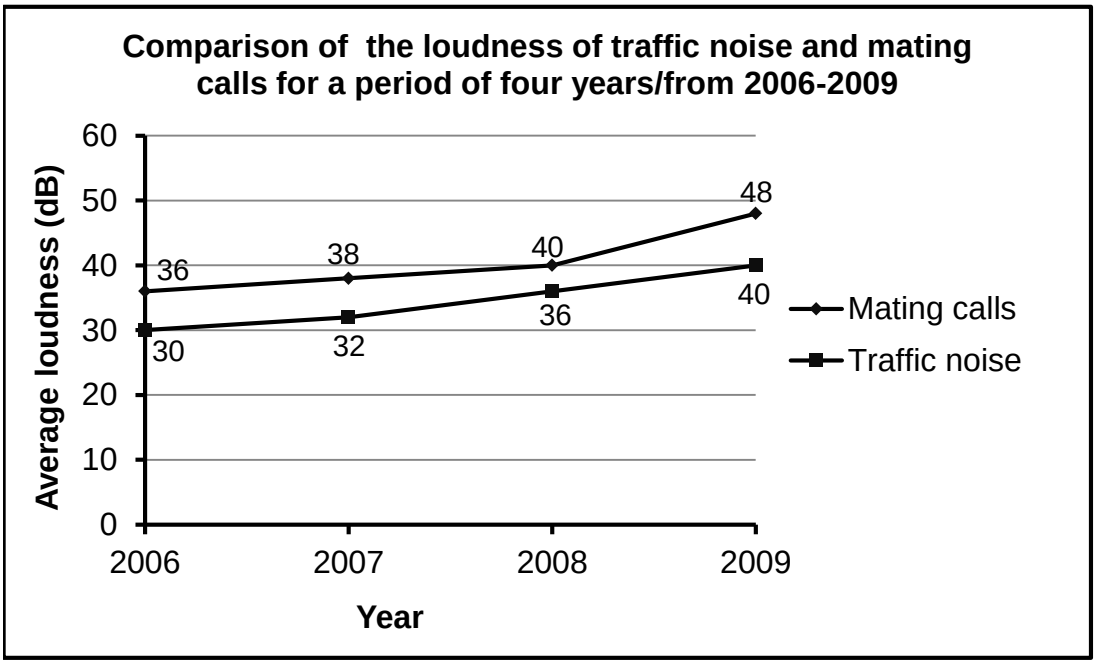
3.1.2
- The investigation was done over a long period✓/6 years
- Many recordings were done in each year✓/ an average was calculated Any 1 (1)

3.1.3 As the traffic noise increased, the loudness of frogs' mating calls increased ✓✓ (2)

3.1.4
- Type of apparatus used✓
- Time of recordings✓
- Distance recordings are taken from✓
- Person taking measurements✓ Any 2 (2)

(Mark first TWO only)

3.1.5



CRITERION	ELABORATION	MARKS
TYPE	Two line graphs on the same set of axes **(T)**	1
KEY	A key or labels for each graph is present **(K)**	1
TITLE	Title of graph includes 3 variables	1
SCALE	Correct scale for X-axis and Y-axes **(S)**	1
LABELS	Correct label and unit for X-axis and Y-axis **(L)**	1
PLOTTING	Correct plotting of points	1: 1 to 7 points plotted correctly 2: Graph drawn for **required years** only, with all 8 points plotted correctly.

(7)

(14)

3.2 3.2.1 (a) RRLL✓ (1)

(b) Red fruit✓ and spiny leaves✓ (2)

3.2.2 $\left\{\frac{3}{16}\right\}$ ✓ x 128✓ = 24✓ (3)

3.2.3 - rrLL✓✓

OR

- One parent is rrLL and the other parent is rrLl✓✓ (2)

(8)

3.3 3.3.1 - The manipulation of genetic material✓
- to produce a genetically different✓/identical organism/repair tissues and organs

OR

- The manipulation of genetic material✓
- to produce something of benefit to humans✓/society (2)

3.3.2 - A plasmid/ circular DNA is removed from the bacterial cell✓
- It is cut✓ using enzymes
- The insulin gene is removed from a human cell✓ and
- inserted into the plasmid✓to form the recombinant DNA (4)

3.3.3 - Bacteria reproduce very rapidly✓,
- forming many copies of the gene✓ in a short period of time

OR

- Bacteria reproduce asexually✓/by mitosis,
- forming identical copies of itself✓

OR

- The bacterial DNA is in the form of a plasmid✓,
- for easy insertion of genes✓

OR

- Bacteria exist everywhere✓,
- so they can be obtained with no difficulty✓/expense

OR

- Bacteria are simple organisms✓,
- so their use is unlikely to raise ethical issues✓ Any 1 x 2 (2)

3.3.4 - Expensive✓/ research money could be used for other needs
- Interfering with nature✓/ immoral
- Potential health impacts✓
- Unsure of long-term effects✓ Any 3 (3)

(Mark first THREE only) **(11)**

3.4	3.4.1	- As the wings were used less✓ - they became reduced in size✓/less developed - and could not be used for flying✓ - This acquired characteristic was passed on to the offspring✓		(4)
	3.4.2	- Breeding at different times of the year✓ - Species-specific courtship behaviour✓ - Adaptation to different pollinators✓ - Infertile offspring✓ - Prevention of fertilization✓ **(Mark first THREE only)**	Any 3	(3) **(7)** **[40]**

TOTAL SECTION B: 80

SECTION C

QUESTION 4

Natural selection
- Organisms produce a large number of offspring✓
- There is variation✓ amongst the offspring
- Some have favourable characteristics and some do not✓
- When there is a change in the environmental conditions✓/ there is competition
- organisms with characteristics which make them more suited during the changed conditions, survive✓
- whilst organisms with unfavourable characteristics, which make them less suited, 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 (7)

Punctuated equilibrium
- Punctuated equilibrium explains the speed at which evolution occurs✓
- It involves long periods of time✓
- where species do not change✓/change gradually through natural selection
- known as equilibrium✓
- alternating with short periods of time✓
- where rapid changes✓ occur through natural selection Any 4 (4)

Differences between natural and artificial selection
- In natural selection, nature selects the characteristics✓ whereas
- in artificial selection humans select a desired characteristic✓

- In natural selection, the characteristic gives the population an evolutionary advantage✓/improves survival whereas
- in artificial selection, a human need✓is fulfilled

- In natural selection, breeding is random✓ whereas
- in artificial selection, humans select organisms to breed✓

- Natural selection involves only one species✓ whereas
- artificial selection may involve more than one species✓

- In natural selection, the characteristics of a population change✓ whereas
- in artificial selection, the characteristics of the population do not necessarily change✓ Any 3 x 2 (6)

(Mark first THREE only)

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

NOTE: NO marks will be awarded for answers in the form of a table, flow charts or diagrams.

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: - natural selection, - punctuated equilibrium and - differences between natural and artificial selection is given. There is no irrelevant information	The description of: - natural selection, - punctuated equilibrium and - differences between natural and artificial selection is logical and sequential.	At least: - **5/7** for the description of natural selection (N) - **2/4** for the description of punctuated equilibrium (P) - **4/6** for differences between natural and artificial selection (D)
Mark	1	1	1

TOTAL SECTION C: 20
GRAND TOTAL: 150