basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS

LIFE SCIENCES P2

2018

MARKING GUIDELINES

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. 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	D✓✓		
	1.1.3	C✓✓		
	1.1.4	B✓✓		
	1.1.5	D✓✓		
	1.1.6	B✓✓		
	1.1.7	A✓✓		
	1.1.8	B✓✓		
	1.1.9	D✓✓	(9 x 2)	**(18)**
1.2	1.2.1	Phylogenetic tree✓/cladogram		
	1.2.2	Cytokinesis✓		
	1.2.3	(DNA) Replication✓		
	1.2.4	Continuous✓variation		
	1.2.5	Biogeography✓		
	1.2.6	Non-disjunction✓		
	1.2.7	Homologous✓ structures		
	1.2.8	Heterozygous✓	(8 x 1)	**(8)**
1.3	1.3.1	None✓✓		
	1.3.2	A only✓✓		
	1.3.3	None✓✓	(3 x 2)	**(6)**
1.4	1.4.1	(a) Ribosome✓		(1)
		(b) W – mRNA✓		
		Y – tRNA✓		(2)
		(c) Nucleotide ✓		(1)
	1.4.2	(a) Cytoplasm✓/endoplasmic reticulum		(1)
		(b) Nucleus✓ /nucleoplasm		(1)
				(6)
1.5	1.5.1	Hominidae✓		(1)
	1.5.2	600✓ cm^3		(1)
	1.5.3	1,6 million years ago✓/mya		(1)
	1.5.4	Taung child✓/ Mrs Ples✓/ } *A.africanus* Karabo✓/*A.sediba* Little foot✓/*A.prometheus* **(Mark first TWO only)**	Any 2	(2)
	1.5.5	*Homo sapiens*✓		(1)
				(6)

1.6	1.6.1	(a) Metaphase **I**✓	(1)
		(b) Telophase **I**✓	(1)
	1.6.2	(a) B✓	(1)
		(b) C✓	(1)
		(c) D✓	(1)
	1.6.3	Testis✓	(1)
			(6)

TOTAL SECTION A: 50

QUESTION 2

2.1 2.1.1 DNA profile✓ (1)

2.1.2 Q✓ (1)

2.1.3 All the DNA bands match the DNA bands of the blood on the broken glass✓ (1)

2.1.4 - Human error could give incorrect results✓
- Only a small amount of DNA was used✓and may not be reliable
- Framing✓/planting false evidence
- Suspect can have an identical twin✓ with the same DNA profile
(Mark first TWO only) Any 2 (2)
(5)

2.2 2.2.1 Protein synthesis✓ (1)

2.2.2 Peptide✓ bond (1)

2.2.3 63✓ (1)

2.2.4 (a) Guanine✓ (1)

(b) (i) CAG✓ (1)

(ii) CCT✓ (1)

(c) CAU✓ (1)
(7)

2.3 - The double helix DNA unwinds✓
- The double-stranded DNA 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✓
- mRNA now has the coded message for protein synthesis✓ Any 6 **(6)**

2.4 2.4.1 (a) Autosomes✓ (1)
(b) Gonosomes✓ /sex chromosomes (1)

2.4.2 Male✓ (1)

2.4.3 - There is a Y-chromosome✓/XY chromosomes
- at chromosome pair 23✓ (2)

2.4.4 One comes from the male parent✓ and the other comes from the female parent✓

OR

One comes from the sperm✓ and the other comes from the ovum✓ (2)
(7)

2.5

P_1 Phenotype Male x Female✓
Genotype XY x XX✓

Meiosis

Fertilisation

Gametes	X	Y
X	XX	XY
X	XX	XY

1 mark for correct gametes
1 mark for correct genotypes

F_1 Phenotype ***50% males**✓ / 50% females

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

OR

P_1 Phenotype Male x Female✓
Genotype XY x XX✓

Meiosis

G/gametes X, Y x X, X ✓

Fertilisation

F_1 Genotype XX; XX; XY XY✓

Phenotype ***50% males**✓ / 50% females

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

(6)

2.6 2.6.1 Dihybrid✓ cross (1)

2.6.2 (a) Black✓ (1)
(b) Black without white patches✓ (1)
(c) Grey with white patches✓ (1)

2.6.3 - They can be homozygous dominant for coat colour✓/ have the genotype BBtt
- or heterozygous for coat colour✓/have the genotype Bbtt (2)

2.6.4 - Alleles of a gene for one characteristic segregate independently✓
- of the alleles of a gene for another characteristic✓
- The alleles for each gene will therefore come together randomly✓ during gamete formation (3)

(9)
[40]

QUESTION 3

3.1 3.1.1
- Stem cells are undifferentiated✓
- and have the potential to develop into any type of cell✓
- to replace the nerve cells that are damaged✓ (3)
- An embryo is a potential life✓/could develop into a baby

3.1.2
- It poses moral or ethical issues✓

OR

- Umbilical cords are discarded✓
- Do not pose a moral or ethical issue✓

(2)
(5)

3.2 3.2.1 One✓/ 1 (1)

3.2.2 Mrs Thomas✓ (1)

3.2.3
- The child has the genotype ii✓/ is homozygous recessive and
- if both parents are heterozygous✓/ have the genotypes I^Ai or I^Bi
- she inherits one recessive allele from each parent✓ (3)
(5)

3.3 3.3.1 Bipedal✓ (1)

3.3.2 A✓ and B✓ (2)
(Mark first TWO only)

3.3.3 Both have a short✓and wide✓ pelvis (2)

3.3.4 Less curved spine✓/C-shaped spine (1)
(Mark first ONE only) **(6)**

3.4 **Differences between the skulls**
T✓

Humans	African apes
Large cranium✓	Small cranium✓
No cranial ridge✓	Cranial ridge across the top of the cranium✓
Brow ridges are not well developed✓	Brow ridges well developed✓
Foramen magnum in a forward position✓	Foramen magnum in a backward position✓
Jaws less protruding /less prognathous✓	Jaws more protruding/more prognathous✓
Smaller jaws✓	Larger jaws✓
Palate shape more rounded✓	Palate shape more rectangular✓
Teeth arranged on a gentle (round) curve✓	Teeth arranged in a less curved way✓
Smaller spaces between the teeth✓	Larger spaces between the teeth✓
Small canines✓	Large canines✓

(Mark first THREE only) Table1+ Any 3 x 2 **(7)**

3.5 3.5.1
- Obtain permission from the relevant authority✓
- Plan when to do the investigation✓
- Get all the equipment✓
- Decide where to obtain shrimp cysts✓
- Decide on the different concentrations of solution to use✓
- Decide on how to record the data✓
- Decide on where to do the investigation✓ Any 2 (2)

(Mark first TWO only)

3.5.2 (a) Salt concentration✓ (1)

(b) Number of cysts that hatched/ percentage of cysts hatched✓ (1)

3.5.3 % Hatched = $\left[\frac{1}{53}\right]$ ✓ $\times 100$✓

= 1,9✓% (accept range 1,88 to 2) (3)

3.5.4
- Temperature✓
- The volume of solution✓ used/30ml solution was used
- Duration✓/the amount of time/ left the beakers for 48 hours
- Cysts from the same type of shrimp✓ Any 3 (3)

(Mark first THREE only)

3.5.5 1%✓salt solution (1)

3.5.6
- There was variation amongst the brine shrimp✓
- Some had the ability to produce cysts✓
- and some did not✓
- When the salt concentration became unfavourable✓
- the brine shrimp which were unable to produce cysts died✓
- Those which were able to produce cysts survived✓
- and reproduced✓
- The allele for producing cysts was passed on to their offspring✓
- The next generation therefore had a higher proportion of brine shrimp with the ability to produce cysts✓ Any 6 (6)

(17)
[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

Mutations (Mu)

- A mutation is a change in the DNA✓/ gene/nucleotide sequence or
- a change in the number✓/size of a chromosome
- Mutations introduce new alleles✓ which results in
- new genotypes✓ and hence
- new phenotypes✓ from one generation to another Any 4 (4)

Meiosis (M)

- In prophase **I**✓ of meiosis
- crossing over✓ occurs
- between homologous chromosomes✓
- resulting in the exchange of genetic material✓
- leading to chromosomes with a mixture of maternal and paternal genetic material✓
- In metaphase✓ of meiosis
- random arrangement of chromosomes occur✓
- leading to chromosomes moving into gametes in different combinations✓ Any 5 (5)

Role of variation in speciation (S)

- Speciation occurred through geographical isolation✓
- The original population was separated by the sea✓/a body of water
- and there was no gene flow✓ between the two populations
- **There was variation in neck length within each population✓ ***
- Each population was exposed to different environmental conditions✓ and
- underwent natural selection independently✓
- Over a long period of time the two populations became different✓
- genotypically and phenotypically✓
- When the two populations were mixed again✓
- they were unable to interbreed to produce fertile offspring✓
- thus indicating the formation of a new species✓ ***Compulsory 1** + Any 7 (8)

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 question	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 the description of mutations and meiosis as sources of variation and the role of variation in speciation is given. There is no irrelevant information.	All the information regarding description of mutations and meiosis as sources of variation and the role of variation in speciation is given in a logical manner	Correct points as follows: - **2/4** for mutations, - **3/5** for meiosis and - **6/8** for the role of variation in speciation
Mark	1	1	1

TOTAL SECTION C: 20
GRAND TOTAL: 150