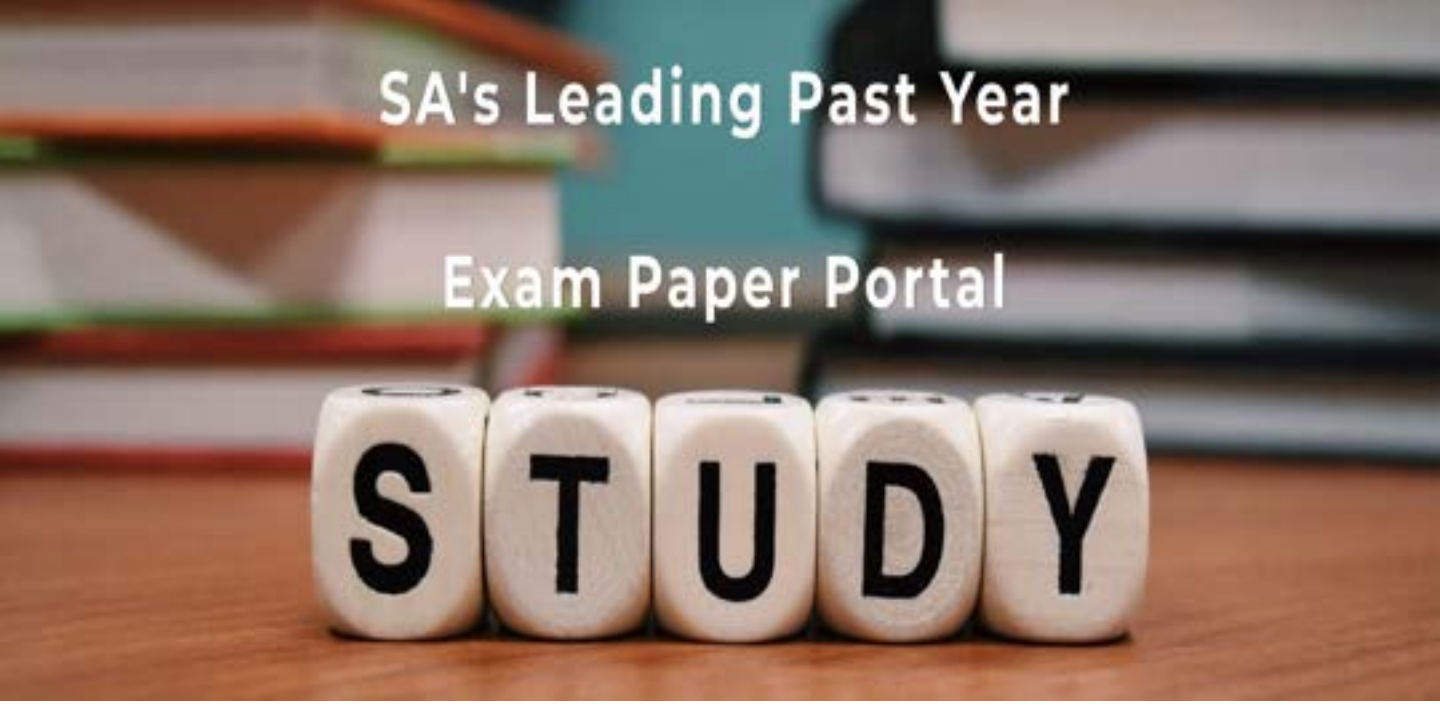

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GRADE 12

LIFE SCIENCES P2

FEBRUARY/MARCH 2018

MARKING GUIDELINES

MARKS: 150

These marking guidelines consist of 11 pages.

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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.

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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.

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SECTION A

QUESTION 1

1.1	1.1.1	A✓✓		
	1.1.2	B✓✓		
	1.1.3	C✓✓		
	1.1.4	B✓✓		
	1.1.5	A✓✓		
	1.1.6	C✓✓		
	1.1.7	C✓✓		
	1.1.8	C✓✓		
	1.1.9	A✓✓	(9 x 2)	**(18)**
1.2	1.2.1	tRNA✓/transfer RNA		
	1.2.2	Cloning✓		
	1.2.3	Stem✓cells		
	1.2.4	Incomplete dominance✓		
	1.2.5	Artificial selection✓/selective breeding		
	1.2.6	Chiasma✓		
	1.2.7	Ribosome✓		
	1.2.8	Biodiversity✓	(8 x 1)	**(8)**
1.3	1.3.1	B only✓✓		
	1.3.2	Both A and B✓✓		
	1.3.3	A only✓✓	(3 x 2)	**(6)**
1.4	1.4.1	DNA✓/Deoxyribonucleic acid		(1)
	1.4.2	Nucleus✓/chromosome Mitochondria✓ **(Mark first TWO only)**		(2)
	1.4.3	(a) Nucleotide✓		(1)
		(b) Guanine✓		(1)
		(c) Phosphate✓		(1)
		(d) Hydrogen✓ bond		(1)
	1.4.4	Double helix✓		(1)
	1.4.5	DNA replication✓		(1) **(9)**

1.5	1.5.1	Phylogenetic✓	(1)
	1.5.2	(a) 5✓	(1)
		(b) 4✓	(1)
	1.5.3	*(Paranthropus) robustus*✓ and *(Paranthropus) boisei*✓	(2)
	1.5.4	(a) Accept any value in the range 4,3 to 4,5 million years ago✓/mya	(1)
		(b) 1 mya✓	(1)
	1.5.5	(a) *Homo neanderthalensis*✓	(1)
		(b) *Homo habilis*✓	(1)
			(9)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 2.1.1 Homologous chromosomes✓ (1)

2.1.2 45✓ (1)

2.1.3 Gonosomes✓ (1)

2.1.4 The presence of a Y chromosome✓/XY chromosome (1)

2.1.5 Chromosome✓mutation (1)

2.1.6
- Non-disjunction occurred✓/A homologous pair of chromosomes failed to separate
- at position 21✓
- during Anaphase✓
- resulting in one gamete with 24 chromosomes✓/an extra chromosome/2 chromosomes at position 21
- The fertilisation of this gamete with a normal gamete✓/gamete with 23 chromosomes/1 chromosome at position 21
- results in a zygote with 47 chromosomes✓
- There are 3 chromosomes✓/an extra chromosome at position 21/ this is Trisomy 21

Any 6 (6)

(11)

2.2 2.2.1 (a) 3✓ (1)
(b) 3✓ (1)

2.2.2 (a) Hearing✓/Normal (1)
(b) Hh✓ (1)

2.2.3 - Lyall inherited one recessive allele✓
- from each parent✓ (2)

2.2.4 **P_1** Phenotype Hearing x Deaf✓
Genotype HH x hh✓
Meiosis
G/gametes H H x h h✓
Fertilisation
F_1 Genotype Hh Hh Hh Hh✓

Phenotype All hearing✓
0% deaf✓*

P_1 and F_1✓
Meiosis and fertilisation✓

***1 Compulsory mark** + Any 6

OR

P_1 Phenotype Hearing x Deaf ✓
Genotype HH x hh ✓

Meiosis

Fertilisation

Gametes	H	H
h	Hh	Hh
h	Hh	Hh

1 mark for correct gametes
1 mark for correct genotypes

F_1 Phenotype All hearing✓
0% deaf ✓*

P_1 and F_1✓
Meiosis and fertilisation✓

***1 Compulsory mark** + Any 6 (7)
(13)

2.3 2.3.1 - Fossil✓/ 'the first fossil'
- Cultural✓/ 'stone tools'/'animal remains' (2)
(Mark first TWO only)

2.3.2 83 000 years✓ (1)

2.3.3 *Australopithecus*✓ (1)
(Mark first ONE only)

2.3.4 - The jaw was more prognathous✓/protruding and
- larger✓ than in humans
- The jaw was more rectangular✓
- The palate shape was less rounded✓/U-shaped/rectangular
- The canines were larger✓
- Large spaces✓/diastema between the teeth Any 3 (3)
(Mark first THREE only)

2.3.5 - A more forward✓position
- of the foramen magnum✓ (2)
(Mark first ONE only)

2.3.6 - Opposable thumbs✓
- Bare fingertips✓
- Nails✓instead of claws
- Pentadactyl✓hand Any 2 (2)
(Mark first TWO only)

2.3.7

HOMO SPECIES✓	**BRAIN VOLUME**✓(cm^3)
H. floresiensis	426
H. habilis	600
H. erectus	860
H. sapiens/modern humans	1300

Guideline for assessing the table

Correct table format (separation of columns)	1
Column headings	2
Data entered	1: 1 to 3 data sets correctly entered 2: All 4 data sets correctly entered

(5)
(16)
[40]

QUESTION 3

3.1 3.1.1 Blood group A✓ (1)

3.1.2 $\frac{40}{100}$ ✓ x $\frac{5\ 000\ 000}{1}$ ✓
= 2 000 000✓/2 million (3)

3.1.3 - The alleles I^A and I^B✓
- are equally dominant✓ (2)

3.1.4 - When phenotypes fit into separate or distinct categories✓
- with no intermediate phenotypes✓ (2)

3.1.5 (a) i✓ (1)
(b) Blood group O✓ (1)
(10)

3.2 3.2.1 - It is characterised by long periods of little or no change✓
- alternating with short periods of rapid change✓
- during which new species may form✓ (3)

3.2.2 They contain toxins✓ which kill the snakes
OR
Too large✓ to be swallowed Any 1 (1)

3.2.3 - Having a smaller jaw✓
- means cane toads cannot be consumed✓
- thereby protecting the snakes from ingesting the toxins✓ (3)

3.2.4 - Since the snakes' jaws were used less ✓/not used
- the snakes developed smaller jaws✓
- This characteristic (of a smaller jaw) was inherited by the offspring✓
- Over many generations the jaw of the snake became smaller✓ (4)
(11)

3.3 3.3.1 Dihybrid✓ cross (1)

3.3.2 (a) Red✓ (1)
(b) Short✓ (1)
(c) Red✓ and Tall✓ (2)
(d) ffhh✓✓ (2)

3.3.3 - When two organisms with pure breeding✓
- contrasting traits✓are crossed
- all the individuals of the F_1 generation will display the dominant trait✓

OR

- If an organism is heterozygous✓
- the dominant allele✓
- will determine the phenotype✓ (3)

(10)

3.4 3.4.1 (a) Exposure to insecticide✓ (1)
(b) Number of insects that survived✓/survival rate of insects (1)

3.4.2 - Sample size✓/300 insects
- Size of containers✓
- Conditions✓
- Concentration of insecticide✓
- Volume of insecticide✓
- Time period✓/24 hours Any 3 (3)

(Mark first THREE only)

3.4.3 - They only conducted the investigation once✓/did not repeat
- They used a small sample/only 300 insects✓
- They used only two storage bins✓ Any 2 (2)

(Mark first TWO only)

3.4.4 Insects that were previously exposed to the insecticide had a higher survival rate✓✓

OR

Insects that were not previously exposed to the insecticide had a lower survival rate✓✓ (2)

(9)
[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

MUTATIONS AND PROTEIN SYNTHESIS

- A mutation is a change in the nucleotide/nitrogenous base sequence✓
- of a DNA molecule✓/a gene
- since mRNA is copied from the DNA molecule✓
- during transcription✓
- This will result in a change in the codons✓
- As a result, different tRNA✓ molecules
- carrying different amino acids✓ will be required
- The sequence of amino acids changes✓
- resulting in the formation of a different protein✓
- If the same amino acid ✓is coded for
- there will be no change✓in the protein structure Any 9 (9)

MUTATIONS AND EVOLUTION IN PRESENT TIMES

- In a population of insects✓/bacteria/HI viruses/Galápagos' finches
- mutations are a source of variation✓
- which may make some organisms more resistant✓/better suited
- to insecticides✓/antibiotics/antiretroviral medication/ drought
- Those individuals that are not resistant/suited will die✓ whereas
- those that are resistant/ well suited, will survive✓
- to pass the resistant allele/resistance on to their offspring✓
- This is known as natural selection✓
- As a result, individuals of the future generations will be resistant to the insecticides✓/antibiotics/antiretroviral medication/adapted to drought Any 8 (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 sequence.	All aspects of the essay have been sufficiently addressed.
In this essay in Q4	Only provided information relevant to: - Mutations and protein synthesis - Mutations and evolution in present times. There is no irrelevant information.	Information on: - Mutations and protein synthesis - Mutations and evolution in present times is presented in a logical sequence	At least the following marks should be obtained: - Mutations and protein synthesis **(7/9)** - Mutations and evolution in present times **(5/8)**
Mark	1	1	1

TOTAL SECTION C: 20
GRAND TOTAL: 150

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