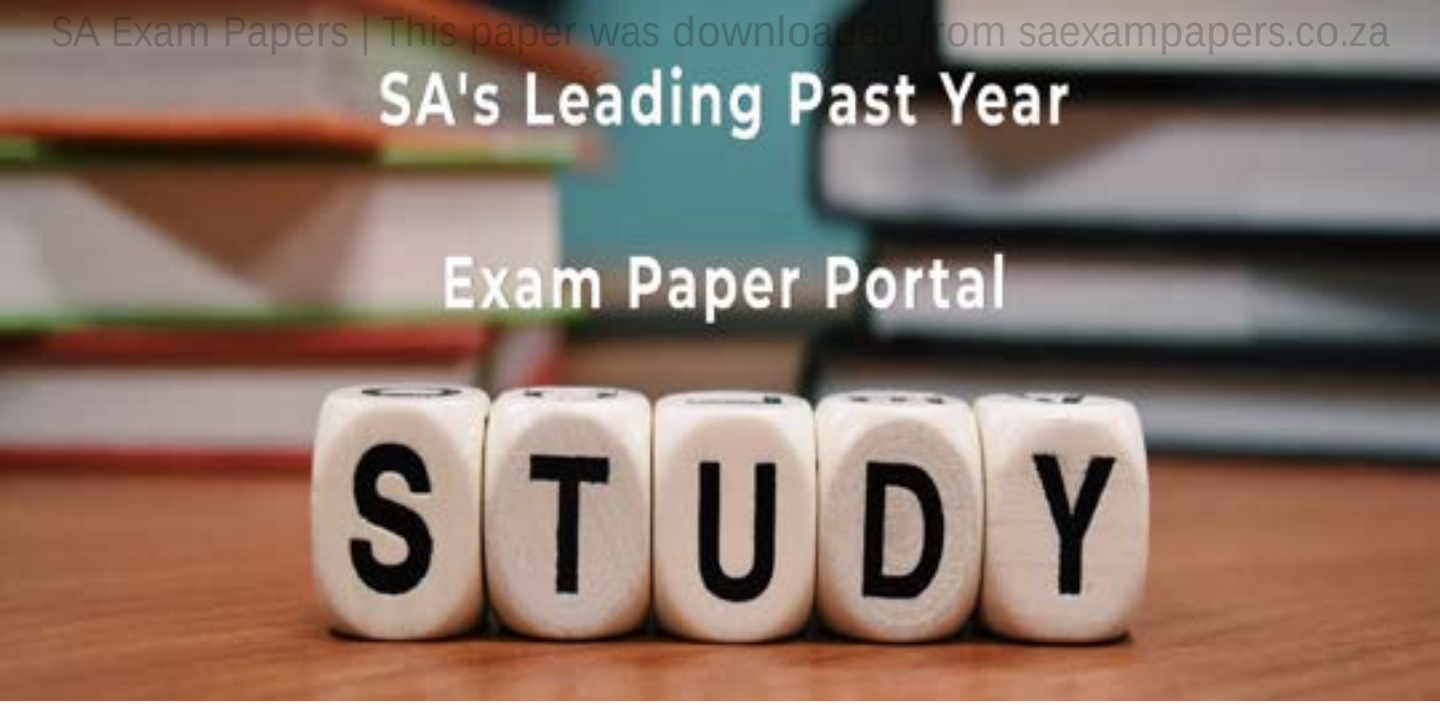


KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

FINAL

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P2

PREPARATORY EXAMINATION

SEPTEMBER 2023

MARKING GUIDELINES

MARKS: 150

This marking guidelines consists of 10 pages.

PRINCIPLES RELATED TO MARKING LIFE SCIENCES SEPTEMBER 2022

1. **If more information than marks allocated is given**
   Stop marking when maximum marks are 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 part of it is required**
   Read all and credit relevant part.

4. **If comparisons are asked for and descriptions are given**
   Accept if 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 is incorrect, do not credit. If sequence and links becomes correct again, resume credit.

9. **Non-recognised abbreviations**
   Accept if first defined in answer. If not defined, do not credit the unrecognized abbreviation but credit the rest of 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 recognizable accept provided it does not mean something else in Life Sciences or if it is out of context.

13. **If common names given in terminology**
    Accept provided it was accepted at the National memo discussion meeting.

14. **If only letter is asked for and only name is given (and vice versa)**
    No 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 appears in any official language other than the learners' 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.

SECTION A

QUESTION 1

1.1	1.1.1	B✓✓		
	1.1.2	D✓✓		
	1.1.3	B✓✓		
	1.1.4	C✓✓		
	1.1.5	D✓✓		
	1.1.6	C✓✓		
	1.1.7	B✓✓		
	1.1.8	B✓✓		
	1.1.9	D✓✓		
	1.1.10	C✓✓		
			(10 x 2)	**(20)**

1.2	1.2.1	Stem✓cells		
	1.2.2	Chiasmata✓		
	1.2.3	Cloning✓		
	1.2.4	Thymine✓		
	1.2.5	Colour blindness✓		
	1.2.6	Mutation✓		
	1.2.7	Artificial selection✓/Selective breeding		
	1.2.8	Cultural✓evidence		
			(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) DNA replication✓	(1)
		(b) DNA✓ molecule	(1)
		(c) Double helix✓	(1)
	1.4.2	(a) Hydrogen✓bond	(1)
		(b) Deoxyribose sugar✓	(1)
		(c) Nucleotide✓	(1)
	1.4.3	Chloroplast✓	(1)
			(7)

1.5	1.5.1	(a) B✓	(1)
		(b) A✓	(1)
	1.5.2	(a) Homo sapiens	(1)
		(b) Chimpanzee	(1)
	1.5.3	- Pelvis A is short✓ whereas B is long✓ - Pelvis A is wide✓ whereas B is narrow✓ (**Mark the first TWO only**)	(4)

1.5.4 Supports upper body weight✓ (1)
(**Mark the first ONE only**) **(9)**

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 2.1.1 (a) Metaphase II✓ (1)
(b) Chromosome✓ (1)

2.1.2 Gamete✓/sex cell (1)

2.1.3 6✓/six (1)

2.1.4 (a) Non-disjunction✓ (1)
(b) Down syndrome✓ (1)

2.1.5 - Cell in diagram II has three chromosomes✓
- Cell would have 23 chromosomes✓ (2)
(8)

2.2 2.2.1 (a) Nucleus✓ (1)
(b) Amino acid✓ (1)

2.2.2 TAA✓ (1)

2.2.3 - Transcription✓*
- mRNA copies coded message from DNA✓
- which moves to the ribosomes✓
- so that amino acids can be arranged in a specific sequence✓
- for the formation of a specific protein✓

Compulsory 1*+any 2 (3)

2.2.4 - Picks up specific amino acids✓
- and bring them to the ribosomes✓
- has specific anticodons✓ that are
- complementary to the (mRNA) codons✓

Any (3)

2.2.5 (a) Serine✓ (1)

(b) - The anticodon will be UAG✓
- instead of UAA✓
- Amino acid isoleucine will not change✓
- resulting in the same protein✓

Any (3)
(13)

2.3 2.3.1 Pedigree✓ diagram (1)

2.3.2 2✓ (1)

2.3.3 DMD male✓ (1)

2.3.4 (a) X^DX^d✓ (1)

(b) - X^DX^D✓
- X^DX^d✓ (2)

2.3.5
- Individual A is unaffected✓
- caused by dominant allele on X chromosome✓/X^D
- Offspring C inherits Y chromosome from individual B✓/father
- and X^d from individual A✓/mother

OR

- Individual A has an offspring C who is affected
- Therefore, receiving a recessive allele/X^d from individual A
- individual A must have a dominant allele as well
- hence she is unaffected Any (3)

2.3.6 $\frac{1}{2}$✓ x 100✓ = 50%✓ (3)

2.3.7
- DMD is caused by a recessive allele on the X chromosome✓/X^d
- Sons inherit the Y chromosome from their father✓ (2)

(14)

2.4 **P_1** Phenotype Unaffected x Unaffected✓*

Genotype Rr x Rr✓*

Meiosis

Gametes R, r x R, r✓

Fertilisation

F_1 Genotype RR, Rr Rr, rr✓

Phenotype 3 unaffected and affected✓

P_1 and F_1✓
Meiosis and fertilisation✓

Compulsory mark 2* + Any 4

OR

P_1 Phenotype Unaffected x Unaffected✓*

Genotype Rr x Rr✓*

Meiosis

Fertilisation

F_1

Gametes	R	r
R	RR	Rr
r	Rr	rr

1 mark for correct gametes
1 mark for correct genotypes

Phenotype 3 unaffected and affected✓

P_1 and F_1✓
Meiosis and fertilisation✓ **Compulsory mark** 2* + Any 4 **(6)**

2.5 2.5.1 (a) I^Bi✓ (1)
(b) O✓ (1)

2.5.2 Complete✓ dominance (1)

2.5.3 Man 2✓ (1)

2.5.4 - Man 1 or man 3 could be the father of Sipho✓
- since both man may have recessive allele✓/i / I^Ai or ii✓
- The mother must have genotype I^Bi✓ since she is blood type B
- Sipho would have inherited the recessive allele/i from both parents✓
- and he would have the genotype ii✓ (5)
(9)
[50]

QUESTION 3

3.1 3.1.1 Dihybrid✓cross (1)

3.1.2 An allele that is masked/not shown in the phenotype when found in the heterozygous condition✓✓

OR

An allele that is expressed in the phenotype when found in the homozygous condition✓✓ (2)

3.1.3 Two✓/2 (1)

3.1.4 (a) Black fur, prick-eared✓ (1)
(b) Bbee✓✓ (2)
(c) - bE✓ (1)
- be✓ (1)

3.1.5 (a) Offspring 2✓ (1)
(b) Offspring 1✓ (1)
(11)

3.2 3.2.1 (a) - Nausea✓
- Eye discomfort✓ (2)
(**Mark the first TWO only**)

(b) - Diarrhoea✓
- Stomach cramps✓
- Fever✓ Any (2)
(**Mark the first TWO only**)

3.2.3
- Natural selection✓ occurs
- There is variation✓/mutation in the population of bacteria
- Some are resistant to the antibiotic ciprofloxacin, some are non-resistant✓
- When ciprofloxacin is used✓
- The bacteria that are non-resistant are killed✓ by the ciprofloxacin
- Those that are resistant survive and reproduce✓
- The characteristic for resistance to ciprofloxacin is passed on to the offspring✓
- The next generation will have a higher proportion of ciprofloxacin resistant bacteria✓ Any (6)

(10)

3.3 3.3.1 (a) Percentage of mice killed by predators✓ (1)

(b) Fur colour✓ (1)

3.3.2 It results in light brown fur that camouflage well against the sand✓ (1)
Mark the first ONE only

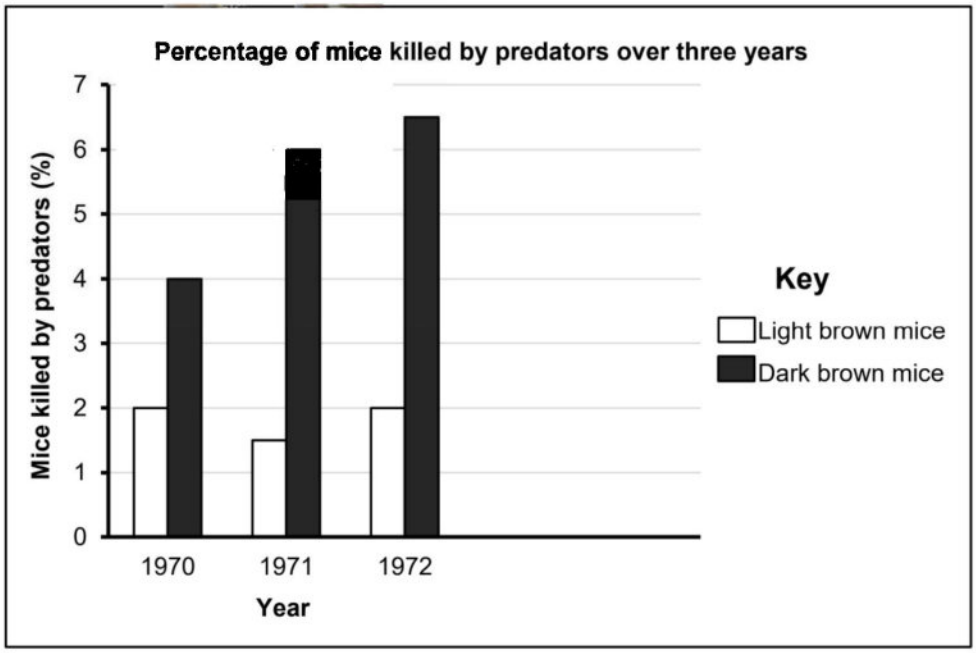
3.3.3 Repeated the investigation for five years✓ (1)
Mark the first ONE only

3.3.4 The light brown mice have lesser percentage killed by predators than dark brown mice✓✓

OR

The dark brown mice have higher percentage killed by predators than light brown mice✓✓ (2)
Mark the first ONE only

3.3.5



Guideline for assessing the graph

CRITERIA	ELABORATION	MARK
Correct type of graph **(T)**	Bar graph drawn	1
Caption of graph **(C)**	Both variables included	1
Axes labels **(L)**	X- and Y-axes correctly labelled	1
Scale for X- and Y-axes **(S)**	- Equal space and width of bars for X-axes and - Correct scale for Y-axes	1
Plotting of co-ordinates **(P)**	1 to 5 co-ordinates plotted correctly Only first 3 years co-ordinates plotted correctly	1 2

(6)
(12)

3.4 3.4.1 'Out of Africa'✓ hypothesis (1)

3.4.2 (a)
- Homo erectus✓
- Homo sapiens✓

Any (2)
Mark the first TWO only

(b)
- Ardipithecus✓
- Australopithecus✓
- Homo habilis✓

(2)
Mark the first TWO only

3.4.3 Hominidae✓ (1)

3.4.4 Genetic✓ evidence (1)
(7)

3.5 3.5.1 It has characteristics common to both giraffes A and B✓
OR
It has intermediate characteristics between giraffe A and B✓ (1)
Mark the first ONE only

3.5.2
- Ancestor of giraffes was having short neck✓
- Environment change to have long trees✓
- It stretched the neck to feed on top branches✓
- The neck developed and became long✓
- to feed on top branches✓
- Giraffe passed on long neck to the offspring✓

Any (4)
(5)

3.6 3.6.1 Breeding at different times✓ (1)

3.6.2
- Species-specific courtship behavior✓
- Infertile offspring✓
- Prevention of fertilisation✓

Any (2)
Mark the first TWO only

3.6.3 - If they were allowed to interbreed✓
- and cannot produce fertile offspring✓

OR

- Analysis of DNA✓
- to check the matching sequence✓ Any (2)

(5)
[50]

TOTAL SECTION B: 100

GRAND TOTAL: 150