KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P2

MEMO

PREPARATORY EXAMINATION

SEPTEMBER 2024

MARKS: 150

This marking guideline consists of 11 pages.

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PRINCIPLES RELATED TO MARKING LIFE SCIENCES SEPTEMBER 2024

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.

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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.

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SECTION A

QUESTION 1

1.1 1.1.1 B✓✓
1.1.2 A✓✓
1.1.3 D✓✓
1.1.4 D✓✓
1.1.5 C✓✓
1.1.6 B✓✓
1.1.7 C✓✓
1.1.8 D✓✓
1.1.9 C✓✓

(9 x 2) **(18)**

1.2 1.2.1 Down Syndrome ✓
1.2.2 Homologous structure ✓
1.2.3 Gene ✓
1.2.4 Transcription ✓
1.2.5 Stem cells ✓
1.2.6 Biogeography ✓
1.2.7 tRNA ✓
1.2.8 Haploid ✓
1.2.9 Recessive ✓

(9 x 1) **(9)**

1.3 1.3.1 B only ✓✓
1.3.2 A only ✓✓
1.3.3 B only ✓✓

(3 x 2) **(6)**

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1.4	1.4.1	(a)	Crossing over ✓	(1)
		(b)	Prophase I ✓	(1)
	1.4.2	(a)	Chiasma ✓	(1)
		(b)	Chromosome ✓	(1)
	1.4.3		C ✓ Centromere ✓	(2)
	1.4.4		rTnD ✓ (any order)	(1)
	1.4.5	(a)	4 ✓	(1)
		(b)	4 ✓	(1)
				(9)
1.5	1.5.1	(a)	- Australopithecus ✓ - Homo ✓	(2)
		(b)	- Australopithecus africanus ✓ - Homo erectus ✓	(2)
	1.5.2		0.8 million years ✓ / 800 thousand years	(1)
	1.5.3	(a)	- Mrs Ples ✓ - Little Foot ✓	(2)
		(b)	Hominidae ✓	(1)
				(8)
			TOTAL SECTION A:	**50**

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SECTION B

QUESTION 2

2.1	2.1.1	(a)	6 ✓		(1)
		(b)	21 ✓		(1)
	2.1.2	Ribosome ✓			(1)
	2.1.3	(a)	AUG ✓		(1)
		(b)	Leucine ✓		(1)
		(c)	- Different protein will be formed ✓ - since anticodon AAG✓ - changed to UAG ✓ - and phenylalanine ✓ - will be replaced by isoleucine ✓ in a protein	Any	(4)
		(d)	- Change in the sequence of bases ✓ / nucleotides - in a DNA molecule ✓ - a gene mutation will occur✓	Any	(2)
					(11)
2.2	2.2.1	(a)	Determining identity of criminals ✓ **(Mark the first ONE only)**		(1)
		(b)	Discrepancies in legal proof in court cases ✓ **(Mark the first ONE only)**		(1)
	2.2.2	- A child received DNA from both parents ✓ - DNA profiles of the mother, child and the possible father are determined ✓ - DNA bars of the mother and the child are compared ✓ - Remaining DNA bars are compared to the possible father's DNA bars✓ - If all the remaining DNA bars in the child's profile match the possible father's DNA bars✓ - then the possible father is the biological father✓ - If all the remaining DNA bars in the child's profile does not match the possible father DNA bars✓ - then the possible father is not the biological father✓		Any	(6)
					(8)

2.3 2.3.1 Complete dominance✓ (1)

2.3.2 (a) Long and twisted horns✓ (1)

(b) - LT
- Lt
- lT
- lt
✓ ✓✓✓ (3)

(c) Lltt✓ (1)

(d) 1:3✓ (1)

(7)

2.4 2.4.1 White fur✓ (1)

2.4.2 - Both individual 3 and 4 have brown fur✓
- The offspring 7 has white fur✓
- which is expressed in the phenotype of homozygous condition✓
- Each parent must be heterozygous✓/carrying recessive allele
- The offspring inherited recessive allele from both parents✓ (4)

2.4.3 5 and 6 ✓ (1)

2.4.4 - They interbreed ✓
- and produce a fertile offspring ✓ (2)

2.4.5 4✓ (1)

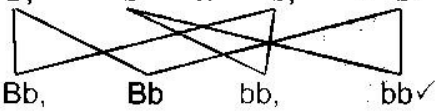
2.4.6 **P_1** Phenotype Brown fur x White fur✓

Genotype Bb x bb✓

Meiosis

Gametes B, b x b, b✓

Fertilisation



F_1 Genotype Bb, **Bb** bb, bb✓

Phenotype 2 brown **fur and 2** white fur✓

Phenotypic ratio: 1:1✓*

P_1 and F_1✓

Meiosis and fertilisation✓ **Compulsory mark** 1* + Any 6

OR

P_1	Phenotype	Brown fur	x	white fur✓
	Genotype	Bb	x	bb✓

Meiosis

Fertilisation

Gametes	B	b
b	Bb	bb
b	Bb	bb

1 mark for correct gametes
1 mark for correct genotypes

F_1

Phenotype 2 brown fur and 2 white fur✓
Phenotypic ratio: 1:1✓*

P_1 and F_1✓

Meiosis and fertilisation✓ **Compulsory mark** 1* + Any 6 (7)

(16)

2.5 2.5.1 An organism in which the genetic material is manipulated for the benefit of a human desirable characteristic✓✓ (2)

2.5.2 (a) - Allergic reactions✓
- Antibiotic resistance✓
(Mark the first TWO only) (2)

(b) - Food security✓
- Resistance to diseases✓
(Mark the first TWO only) (2)

2.5.3 - To produce a glyphosate-resistant soybean✓
- since weeds are resistant to glyphosate✓ (2)
(8)

[50]

QUESTION 3

3.1 3.1.1 Karyotype✓ (1)

3.1.2 Cones✓ (1)

3.1.3 (a) Gonosomes✓/sex chromosomes (1)
(b) X^bY✓ (1)

3.1.4
- Similar size✓
- Similar shape✓
- Same location of centromere✓
- Position of gene✓/ alleles
- Genes coding for the same characteristics✓ Any (3)

3.1.5 - 46 chromosomes✓ / 23 pairs of chromosome (1)
(8)

3.2 3.2.1 To determine the relationship between the toxic chemicals and survival of insects ✓✓ (2)

3.2.2 Survival of insects✓ (1)

3.2.3
- Obtain permission from the greenhouse owner to conduct investigation✓
- Decide on the sample size✓
- Decide on the recording tool✓
- Decide on time/date✓
- Decide on the insect types✓
- Decide on the predator type✓ Any (3)

(Mark the first THREE only)

3.2.4 (a)
- Lizards of the same species✓ were used
- The ratio of fire-flies to fruit-flies✓
- Same environmental conditions✓ in greenhouse structure Any (1)

(Mark the first ONE only)

(b) 200 insects of each were used✓ (1)
(Mark the first ONE only)

3.2.5 $\left.\frac{60}{100}\right\}$ ✓ x 200✓

= 120 ✓ (3)

(11)

3.3
- If a population of a single species becomes separated by a geographical barrier✓ (sea, river, mountain, lake)
- then the population splits into two✓
- There is now no gene flow between the two populations✓
- Since each population may be exposed to different environmental conditions✓/the selection pressure may be different
- natural selection occurs independently✓ in each of the two populations
- such that the individuals of the two populations become very different✓ from each other
- genotypically and phenotypically✓
- Even if the two populations were to mix again✓
- they will not be able to interbreed✓
- The two populations are now different species✓ Any **(6)**

3.4 3.4.1 By counting the number of different insecticides that Colorado potato beetle resisted✓ (1)

3.4.2
- Insecticide resistance increased✓
- from 1960 to 2000✓
- and remained constant in 2010✓ (3)

3.4.3
- Buying different types of insecticides✓
- will be very expensive✓
- leading to a greater loss of money ✓ (3)

3.4.4
- Colorado potato beetle show variation✓
- Some have insecticide-resistant and others do not✓
- If there is an application of insecticides✓
- Colorado potato beetle with resistance survive✓
- whilst those without resistance died✓
- those that survive, reproduce✓
- and pass the allele for resistance to their offspring✓
- The next generation will therefore have a higher proportion of Colorado potato beetle with resistance✓ (6)

(13)

3.5 3.5.1 A ✓ (1)

3.5.2

A ✓	B
It is long✓	It is short✓
It is narrow✓	It is wide✓

(1 mark for table + 4) (5)

(Mark the first TWO only)

3.5.3 - it is in forward position✓
- to support the skull✓
- allows for bipedalism✓
- enables upright posture✓ Any (2)

3.5.4 - Every cell has mitochondrion with DNA✓
- Mitochondrial DNA is only inherited through the maternal line✓
- The analysis of mutations on the mitochondrial DNA✓
- shows that the oldest female ancestor was located in Africa✓
- and that all humans descended from her✓/mitochondrial Eve Any (4)

(13)

[50]

TOTAL SECTION B: 100

GRAND TOTAL: 150

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