KWAZULU-NATAL PROVINCE

EDUCATION

REPUBLIC OF SOUTH AFRICA



NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P2

PREPARATORY EXAMINATION

SEPTEMBER 2022

MARKING GUIDELINES

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MARKS: 150

This marking guidelines consists of 9 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

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

1.2	1.2.1	Locus✓		
	1.2.2	Centrosome✓		
	1.2.3	Cytokinesis✓		
	1.2.4	Uracil✓		
	1.2.5	Replication✓		
	1.2.6	Prognathous✓		
	1.2.7	Population✓		
	1.2.8	Extinction✓		
			(8 x 1)	**(8)**

1.3	1.3.1	A only✓✓		
	1.3.2	Both A and B✓✓		
	1.3.3	B only✓✓		
			(3 x 2)	**(6)**

1.4	1.4.1	(a) C✓		(1)
		(b) A✓		(1)
	1.4.2	Bipedalism✓		(1)
	1.4.3	(a) Homo erectus✓		(1)
		(b) Chimpanzee✓		(1)
	1.4.4	- Opposable thumb✓ - Flat nails✓ - Free rotating arms✓ - Long upper arms ✓ **(Mark the first TWO only)**	Any	(2)
	1.4.5	- Skull A has a larger **cranium**✓ than skull C - Skull A has **smaller teeth**✓ than skull C - Skull A has a less pronounced **brow ridge** than skull C - Skull A is non-**prognathous**✓ than skull C - Skull A has smaller **lower jaws**✓ than skull C **(Mark the first TWO only)**	Any	(2) **(9)**

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1.5	1.5.1	(a) g✓		(1)
		(b) Short with light green leaves✓		(1)
		(c) TtGg✓		(1)
		(d) - tG✓ - tg✓		(2)
	1.5.2	9:3:3:1✓✓		(2)
				(7)
			TOTAL SECTION A:	**50**

SECTION B

QUESTION 2

2.1.	2.1.1	DNA✓		(1)
	2.1.2	- Has thymine✓ - Double stranded✓ - Transcription starts with the DNA molecule✓ (**Mark the first ONE only**)	Any	(1)
	2.1.3	5✓		(1)
	2.1.4	(a) - mRNA/codon will change✓ - leading to different tRNA✓ - bringing valine✓ - instead of methionine✓ - Therefore, different protein will be formed✓	Any	(4)
		(b) CGA✓		(1)
				(8)
2.2		- 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)**
2.3	2.3.1	Man 3✓		(1)
	2.3.2	- Bands of Anna's DNA are a combination of the DNA from each parent✓ - Three bands of Anna are identical to that of the mother✓ - The remaining bands correspond with that of man 3✓		(3)
	2.3.3	DNA of each individual is unique, except in the case of identical twins✓ (**Mark the first ONE only**)		(1)

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2.3.4 - To identify criminals✓
- To identify family relationships other than paternity✓ e.g. siblings
- To diagnose genetic disorders✓
- For tissue typing✓/to establish matching tissues Any (2)
(**Mark the first TWO only**) **(7)**

2.4 2.4.1 (a) Spindle fibre✓ (1)
(b) Centromere✓ (1)
(c) Chromatid✓ (1)

2.4.2 Prophase I✓ (1)

2.4.3 - *Crossing over✓
- Chromosomes come together forming homologous pairs✓
- Chromatids of a homologous pair overlap✓
- at a point called chiasma✓
- at which genetic material is exchanged✓
*__Compulsory mark__ 1 + Any 3 (4)

2.4.4 

Chromosome

Criteria

ELABORATION	MARK
Correct type of shaded chromosome with unshaded portion	1
Caption	1

(2)

2.4.5 - Production of gametes✓
- Reduces chromosome number by half✓/maintains chromosome number in organisms
- Provides Genetic variation✓ (3)
(**Mark the first THREE only**) **(13)**

2.5 2.5.1 4✓ (1)

2.5.2 (a) Red eyes✓ (2)

(b) - RR✓ (1)
- Rr✓

2.5.3 - To have white eyes, offspring B must be homozygous recessive✓/ be rr/ have two alleles for white eyes
- Since one allele is inherited from each parent✓
- the parents must therefore be heterozygous red✓/Rr (3)

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2.5.4 $\frac{4}{5}$ ✓ x 100✓ = 80✓% (3)

(10)

2.6 **P_1** Phenotype Blood type A x Blood type B✓
Genotype $I^A i$ x $I^B i$ ✓

Meiosis
Gametes I^A, i x I^B, i✓

Fertilisation

F_1 Genotype $I^A I^B$, $I^A i$ $I^B i$, ii✓

Phenotype AB A B O✓*

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

OR

P_1 Phenotype Blood type A x Blood type B✓
Genotype $I^A i$ x $I^b i$✓

Meiosis

Fertilisation

F_1

Gametes	I^A	i
I^B	$I^A I^B$	$I^B i$
i	$I^A i$	ii

1 mark for correct gametes
1 mark for correct genotypes

Phenotype AB A B O✓*

P_1 and F_1✓
Meiosis and fertilisation✓ **(6)**
***Compulsory mark** 1 + Any 5 **[50]**

QUESTION 3

3.1 3.1.1 Production of an organism that is genetically identical✓ to the one from which it was produced✓ (2)

3.1.2 - To ensure that the DNA of the ovum/characteristic is removed✓
- so that only the desired DNA is present in the clone✓
- Correct number of chromosomes is present in the clone✓ Any (2)

3.1.3 (a) 54✓ (1)
(b) 27✓ (1)
(6)

3.2 3.2.1 (a) Genetically modified plants✓ (1)
(b) yield✓ (1)

3.2.2 To increase reliability✓ (1)



3.2.3
- Same number/300 of bean seeds sown on each field✓
- Same size of field✓
- Same amount of fertiliser✓
- Same type of fertiliser✓

Any (2)

Mark the first TWO only

3.2.4
- To serve as control✓
- so that it can be compared with the other group✓
- and show that the inserted gene is the only factor that affects the results✓/improves the validity of the investigation (3)

(8)

3.3
- There is variation✓ in the species of berries
- Holly berries are poisonous, gooseberries are not✓*
- Gooseberries are eaten✓ by herbivores
- Holly berries are not eaten✓
- so they survive and reproduce✓
- passing on the allele for poison to the next generation✓
- The next generation of berries will have higher proportion of poisonous berries✓/holly berries

***Compulsory mark** 1 + Any 5 **(6)**

3.4

NATURAL SELECTION	**ARTIFICIAL SELECTION**
Nature selects	Humans select
Selection is in response to suitability to the environment	Selection is in response to satisfy human needs
Selected individuals adapt to changing environmental conditions	Selected individuals adapt only under controlled conditions
Occurs within one species	May involve more than one species
Selection occurs in natural populations	Selection occurs in domestic populations

(1 mark for table + Any 2 x 2) **(5)**

3.5 3.5.1 (a) Biogeography✓ (1)
(b) Ability to fly✓ (1)

3.5.2
- Use and disuse✓
- Inheritance of acquired characteristics✓ from parents to offspring (2)

Mark the first TWO only

3.5.3
- The original population /common ancestor once lived on the same area✓
- and became separated by geographical barrier✓/sea/ocean
- There was no gene flow amongst the two populations✓
- Each population experienced different environmental conditions✓
- and underwent natural selection independently✓
- The individuals in each population became different✓
- genotypically and phenotypically✓
- Even if the (two) populations are mixed again✓
- they would not be able interbreed and produce fertile offspring✓
- forming the different species, the rhea and emu✓*

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

(11)

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3.6 3.6.1 (a) - Ardipithecus✓
- Australopithecus✓ (2)
Mark the first TWO only

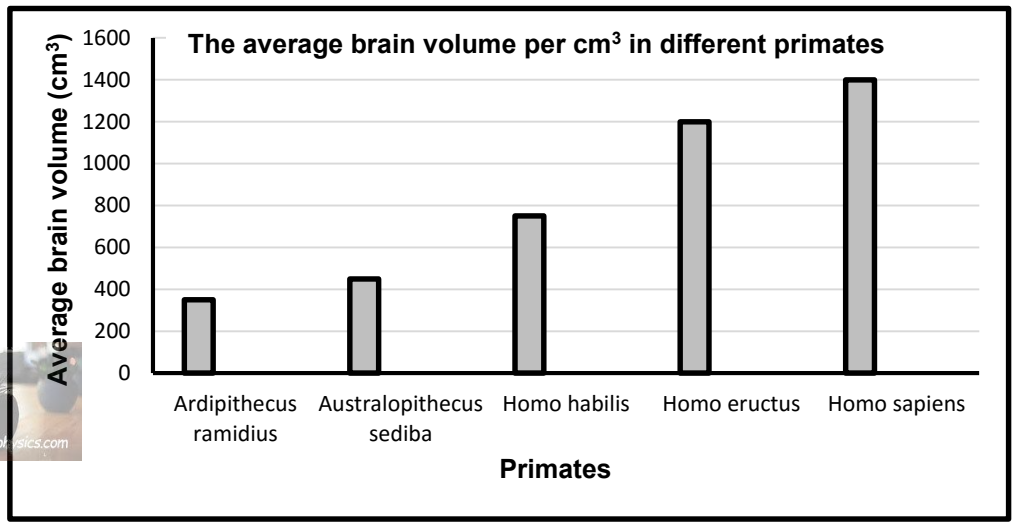
(b) - Genetic✓ evidence
- Cultural✓ evidence (2)
Mark the first TWO only

3.6.2 1.4 mya✓ (1)

3.6.3 - Processing a large amount of information✓/faster processing
- Development of communication skills✓
- Store many years' worth of information (2)
Mark the first TWO only

3.6.4 There is an overlap in their period of existence✓/they both existed between 2 and 1,4 mya (1)

3.6.5



(6)

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-axis correctly labelled	1
Scale for X- and Y-axes **(S)**	- Equal space and width of bars for X-axis and - Correct scale for Y-axis	1
Plotting of Bars **(P)**	1 to 4 bars plotted correctly All 5 bars plotted correctly	1 2

(14)
[50]

TOTAL SECTION B: 100

GRAND TOTAL: 150

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