education

Department of Education
FREE STATE PROVINCE

PREPARATORY EXAMINATION

GRADE 12

LIFE SCIENCES P2

SEPTEMBER 2024

MARKS: 150

MARKING GUIDELINES

These marking guidelines consist of 13 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 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 the 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 the 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 the sequence and links become correct again, resume credit.

9. **Non-recognised abbreviations**
   Accept if first defined in the answer. If not defined, do not credit the unrecognised abbreviation, but credit the rest of the answer if correct.

10. **Wrong numbering**
    If the answer fits into the correct sequence of questions, but the wrong number is given, it is acceptable.

11. **If the 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.

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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. The memorandum will allocate marks for units separately.

16. **Be sensitive to the sense of an answer, which may be stated differently.**

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 applies to all official languages.

19. **Changes to the marking guidelines**
No changes must be made to the memorandum. The provincial internal moderator must be consulted.

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SECTION A

QUESTION 1

1.1	1.1.1	A ✓✓		
	1.1.2	C ✓✓		
	1.1.3	D ✓✓		
	1.1.4	C ✓✓		
	1.1.5	D ✓✓		
	1.1.6	B ✓✓		
	1.1.7	A ✓✓		
	1.1.8	D ✓✓		
	1.1.9	B ✓✓		
			(9 x 2)	**(18)**
1.2	1.2.1	Multiple ✓ alleles		
	1.2.2	Genome ✓		
	1.2.3	Cytokinesis		
	1.2.4	Diastema		
	1.2.5	Extinction		
	1.2.6	Autosomes		
	1.2.7	Co-dominance		
	1.2.8	Hominidae		
			(8 x 1)	**(8)**
1.3	1.3.1	B only		
	1.3.2	A only		
	1.3.3	A only		
			(3 x 2)	**(6)**
1.4	1.4.1	Karyotype ✓		(1)
	1.4.2	Male ✓		(1)
	1.4.3	- Chromosome pair 23 ✓/position 23 - Has an X and Y chromosome✓/one large and one small chromosome /chromosomes are not the same size		(2)
	1.4.4	Prophase I✓/Prophase 1		(1)
	1.4.5	45✓✓ chromosomes		(2)
				(7)

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1.5	1.5.1	FFHH ✓x ffhh ✓/FFHH and ffhh		(2)
	1.5.2	(a)	High ✓	(1)
		(b)	f ✓	(1)
		(c)	Few cobs/heads and low draught resistance ✓✓	(2)
		(d)	10:1✓✓ /9:1	(2)
		(e)	4/16 ✓ x 100 ✓ = 25 ✓%	(3)
				(11)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 2.1.1 Position 15.5 ✓ on chromosome 11 ✓ (2)

2.1.2 Gene ✓ mutation (1)

2.1.3 Methionine ✓✓/MET/ (2)

2.1.4 AAA ✓ (1)

2.1.5 TGC ✓✓ (2)
(8)

2.2 2.2.1 (Hair)Sample 4 ✓ (1)

2.2.2
- NONE of the DNA profile bars of sample 4 ✓ match with
- any of the other sample DNA profile bars. ✓
- Sample 4 is therefore not related ✓ to any of the other
- people.
- Does not live together ✓ in the house with the family.

(Any 3) (3)

2.2.3
- The hair could belong to anybody who visited the house ✓/work in the house/friends visited the house.
- The presence of DNA does not prove that the person committed the crime. ✓ (2)

(6)

2.3 2.3.1
- Both DNA strands act as templates. ✓
- Thymine/(T) is attached to adenine/(A). ✓
- Two identical DNA-molecules form ✓ **(Any 2)** (2)

2.3.2 (a) Nucleotide ✓ (1)

(b) Deoxyribose ✓ sugar (teach **Deoxyribose sugar**) (1)

(c) (Weak) Hydrogen ✓ bond (1)

2.3.3
- During mitosis one mother cell will divide into two **identical daughter cells**. ✓
- For each daughter cell to have **identical genetic information** as the mother cell, DNA has to make a copy before cell division. ✓
- Each daughter cell then contains the **exact DNA** composition as the mother cell. ✓ **(Any 2)** (2)

(Mark first TWO only) **(7)**

2.4

mRNA	tRNA
Unlimited/many nucleotides/nitrogen bases	Only 3 nucleotides/nitrogen bases
Long/linear structure/single strand	Folded structure/Hairpin shape/ T-shape
Three nitrogen bases form a codon/ Many codons	Three nitrogen bases form an anti-codon/ One Anticodon

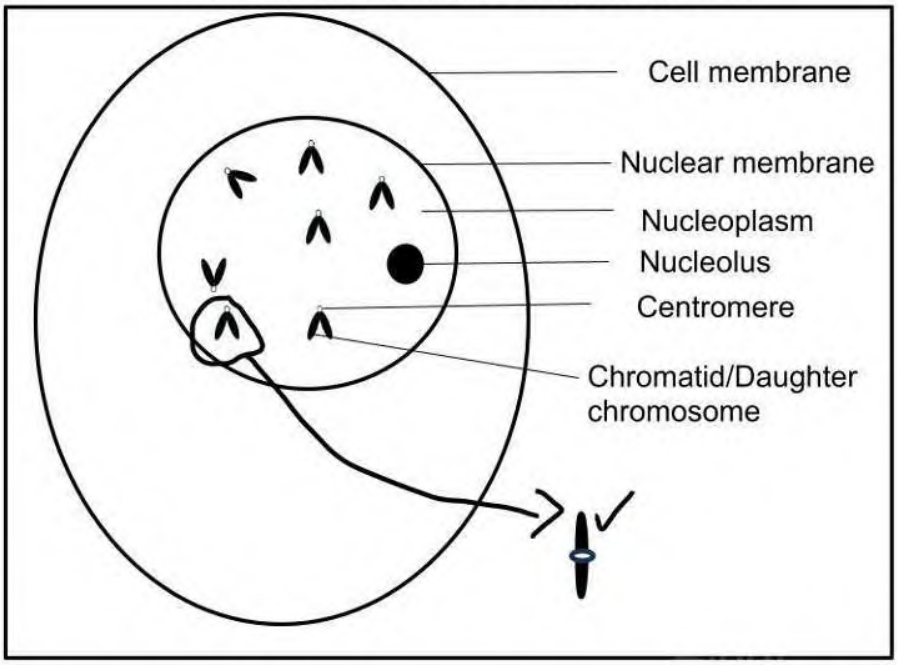
(Mark first TWO only) Table 1 +(2 x 2) **(5)**

2.5 2.5.1 Anaphase II ✓ (1)

2.5.2 Non-disjunction ✓ (1)

2.5.3
- The gamete will have one extra chromosome/ 7 chromosomes ✓
- Therefore, the zygote will have an extra chromosome ✓/ 2n +1/13 (2)

2.5.4 Structure B/gamete (B) during telophase II



Criteria	Elaboration	Mark
Heading **(H)**	Gamete **B**/structure **B** in telophase II	(1)
Drawing **(D)**	SEVEN single chromatids/daughter chromosomes	(1)
Labels **(L)**	Any ONE correct label Any TWO correct labels Any THREE correct labels	(1) (2) (3)

(5)
(9)

2.6 2.6.1 Incomplete ✓ dominance (1)

2.6.2 1 ✓ (1)

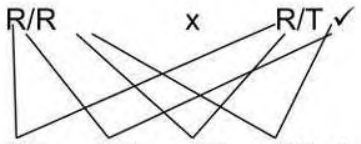
2.6.3 P1 Phenotype Curly hair x Wavy hair ✓

Genotype RR x RT ✓

Meiosis

Gametes R/R x R/T ✓

Fertilisation



F1 Genotype RR RT RR RT ✓

Phenotype Curly hair, wavy hair, curly hair, wavy hair ✓

50% chance for curly hair
50% chance for wavy hair ✓*

P1 and F1 ✓
Meiosis and fertilisation ✓

***1 compulsory mark + any 5**

OR

P1 Phenotype Curly hair x Wavy hair ✓

Genotype RR x RT ✓

Meiosis

Gametes	R	R
R	RR	RR
T	RT	RT

1 mark for correct gametes ✓
1 mark for correct genotypes ✓

Phenotype Curly hair, wavy hair, curly hair, wavy hair ✓

50% chance for curly hair
50% chance for wavy hair ✓*

P1 and F1 ✓
Meiosis and fertilisation ✓

***1 compulsory mark + any 5** (6)
(8)

2.7	2.7.1	C ✓		(1)
	2.7.2	- The pelvis is short and wide ✓		(1)
	2.7.3	- Precision ✓/power grip		(1)
	2.7.4	A, D, E ✓✓		(2)
	2.7.5	- Organism B has small canines ✓ and organism D has large canines ✓ - Organism B has no diastema ✓ and organism D has a diastema ✓ **(Mark first ONE only)**	**(Any)**	(2) **(7)** **[50]**

QUESTION 3

3.1 3.1.1
- The (direct) manipulation/change
- of an organism's genetic material ✓✓ (2)

3.1.2
- The sample size is too small ✓/only two calves were studied in the investigation/only one calf in each group
- The investigation was not repeated ✓/done once (2)

3.1.3
- The calf that was fed on milk from a genetically modified cow. ✓ (1)

3.1.4
- Cattle will gain more weight ✓/be heavier/have more meat
- Faster ✓/in a shorter period of time
- resulting in a larger profit ✓/more money when meat is sold (3)

3.1.5 Bar graph ✓ (1)

3.1.6 Weight (kg) of calves fed different types of milk over 6 weeks.

Time (weeks)	Weight of calf fed on milk from genetically modified cow (kg)	Weight of calf fed on milk from a normal cow (kg)
Birth	35	35
2	50	45
4	65	55
6	80	65

Rubric for marking table:

Criteria	Elaboration	Marks
Table draw **(T)**	Rows and columns drawn	1
Heading **(H)**	Both variables included	1
Labels of columns **(L)**	All three columns are correctly labelled	1
Units **(U)**	Unit of 'weeks' and 'kg' included	1
Correct data captured **(D)**	1 to 6 values correctly captured 7 to 8 values correctly captured	1 2

(6)
(15)

3.2 3.2.1 Ocean ✓/sea/high seas (1)

3.2.2 - Allow them to interbreed with the original population, if they produce fertile offspring ✓ they are still the same species ✓

OR

- Allow them to interbreed with the original population, if they produce infertile offspring ✓ they are not of the same species/form a new species. ✓

OR

- DNA profiling can be done ✓ by comparing the DNA profiles of the original population with the iguanas (2)

3.2.3 - They will differ genotypically ✓/genetically/genetic make-up will be different/various forms of alleles
- and phenotypically/observable traits will be different ✓ (2)

3.2.4 - Breeding at different times of the year ✓
- Specie-specific courtship behaviour ✓
- Producing infertile offspring ✓
- Prevention of fertilisation ✓

(Mark first 2 only) **(Any 2)** (2)

3.2.5 - A population produce a large number of offspring which shows variation ✓
- Some individuals have favourable characteristics and some do not ✓
- When there is a change in the environmental conditions ✓
- Organisms with favourable characteristics will survive ✓
- Organisms with unfavourable characteristics will die ✓
- Organisms that survive will reproduce ✓
- And pass the allele for the favourable characteristic on to the next generation. ✓

(Mark first 4 only) **(Any 4)** (4)

(11)

3.3 3.3.1 - *A. anamensis* ✓
- *A. afarensis* ✓

(Mark first TWO only) (2)

3.3.2
- Better awareness of the environment for food /danger
- Hands are free for use of tools /carrying objects/ weapon/offspring
- Increased surface area of the body for temperature regulation /cooling body down
- Display of reproductive organs as part of courtship behavior

(**Mark first THREE only**) (3)

3.3.3 1 mya/million years ago (1)

3.3.4
- Mrs Ples ✓
- Little foot ✓

(Mark first TWO only) (2)

3.3.5
- As the size of the cranium increased ✓
- The size of the brain increased ✓
- Intelligence also increased ✓/better coordination of movement/improved processing of information (3)

3.4
- mtDNA is transferred from the mother ✓
- to the child ✓
- Mutation occurs in the mtDNA ✓
- By studying these mutations, the female line of ancestors can be traced/can be traced back to 'mother Eve' ✓ (4)

(15)

3.5 3.5.1 Punctuated equilibrium ✓ (1)

3.5.2 (Jay) Gould ✓
(Niles) Eldredge ✓ (2)

3.5.3
- Favourable conditions ✓/No change in the environment
- No competition ✓
- No predation✓ (Any 2) (2)

3.5.4
- Short period ✓
- a sudden change occurs✓/ natural selection
- and speciation take place ✓/new species form **(Any 2)** (2)

3.5.5 - Because they reproduce quickly ✓
- Evolution happens relatively fast/results will be visible in a short period of time ✓
- They have a short life span ✓
- Can easily be kept in a laboratory ✓
- Only need a small amount of food ✓ / nectar to feed them
- The effect of a changing environment can be seen quickly ✓ **(Any 2)** (2)

(9)

[50]

TOTAL SECTION B: 100

GRAND TOTAL: 150

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