



education

Department of
Education
FREE STATE PROVINCE

PREPARATORY EXAMINATION

GRADE 12

LIFE SCIENCES P2

SEPTEMBER 2023

MARKS: 150

Stanmorephysics

MARKING GUIDELINES

This marking guideline consists of 12 pages.

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.
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. 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 memorandum**

No changes must be made to the memorandum. The provincial internal moderator must be consulted.



SECTION A

QUESTION 1

- 1.1 1.1.1 A ✓✓
1.1.2 D ✓✓
1.1.3 B ✓✓
1.1.4 A ✓✓
1.1.5 A ✓✓
1.1.6 B ✓✓
1.1.7 B ✓✓
1.1.8 D ✓✓
1.1.9 C ✓✓ (9 x 2) **(18)**
- 1.2 1.2.1 Quadrupedalism ✓
1.2.2 Peptide ✓
1.2.3 Cranium ✓
1.2.4 Gene mutation ✓
1.2.5 Trisomy 21 ✓/Down Syndrome
1.2.6 Mitochondrial DNA ✓/mt-DNA
1.2.7 Cloning ✓
1.2.8 Co-Dominance ✓
1.2.9 Homologous structures ✓ (9 x 1) **(9)**
- 1.3 1.3.1 Both A and B ✓✓
1.3.2 A only ✓✓
1.3.3 None ✓✓ (3 x 2) **(6)**
- 1.4 1.4.1 DNA profiling ✓ (1)
1.4.2 Baby 3 ✓✓ (2)
1.4.3 – Identifying suspects in a crime ✓
– Tracing missing persons ✓
– Identifying genetic disorders ✓
– Matching tissues for organ transplants ✓
– Identifying dead persons ✓
(Mark first TWO only) Any (2)
(5)
- 1.5. 1.5.1 (a) Bacterial resistance ✓ (1)
(b) Effect of antibiotics ✓ (1)
1.5.2 Natural Selection ✓/Punctuated Equilibrium (1)
1.5.3 Antibiotics ✓ (1)
1.5.4 Resistant Bacteria ✓ (1)
1.5.5 25% ✓ (1)
(6)

- 1.6 1.6.1 a) 5✓ (1)
b) 3✓ (1)
c) 3✓ (1)

- 1.6.2 a) Aa✓/AA✓ (2)
b) Affected female✓ (1)
(6)



TOTAL SECTION A: 50

SECTION B

QUESTION 2

- 2.1 2.1.1 (a) Homologous✓ chromosomes/bivalent (1)
(b) Centromere✓ (1)
(c) Chromatid✓ (1)
2.1.2 Crossing over✓ (1)
2.1.3 Prophase I✓ (1)
2.1.4 Ensures genetic variation✓ (1)
2.1.5 – Chromosomes/chromatids arrange themselves randomly✓
– on either side of the equator✓
– during metaphase I✓/II (3)
(9)



2.2

Meiosis I	Meiosis II
Crossing over takes place✓	No crossing over takes place✓
In metaphase, the chromosomes align on the equator in homologous pairs✓	(In metaphase) chromosomes align singly✓ on the equator
During anaphase, chromosomes✓ move towards the poles	During anaphase, chromatids✓ move towards the poles
Homologous chromosomes in prophase I ✓	Chromosomes occur singly in prophase II ✓
The chromosome number is halved✓/changes from diploid to haploid	The chromosome number remains the same✓
Results in two daughter cells✓	Results in four daughter cells✓

(Mark first THREE only)

Any 3 x 2 + 1 for table

(7)

2.3 2.3.1 'Law' of use and disuse✓

'Law' of the inheritance of acquired characteristics✓

(2)

2.3.2 – Acquired characteristics✓

– are not inherited✓/do not cause any change to the DNA of an organism's gametes

(2)

(4)

- 2.4 – The blood of mother, possible father and the child must be compared✓
- If this shows that it is not possible that these parents can produce a child with his/her blood group✓
- then this man is not the father✓
- If this shows that it is possible that these parents can produce a child with his/her blood group✓
- then he may/ may not be the father✓
- because other males have the same blood group✓

(5)

Any

(5)

2.5 2.5.1 The mapping of the exact position of all the genes in all the chromosomes of an organism/human✓✓

(2)

2.5.2 The breed of the dogs✓

(Mark first ONE only)

(1)



2.5.3 Calculations

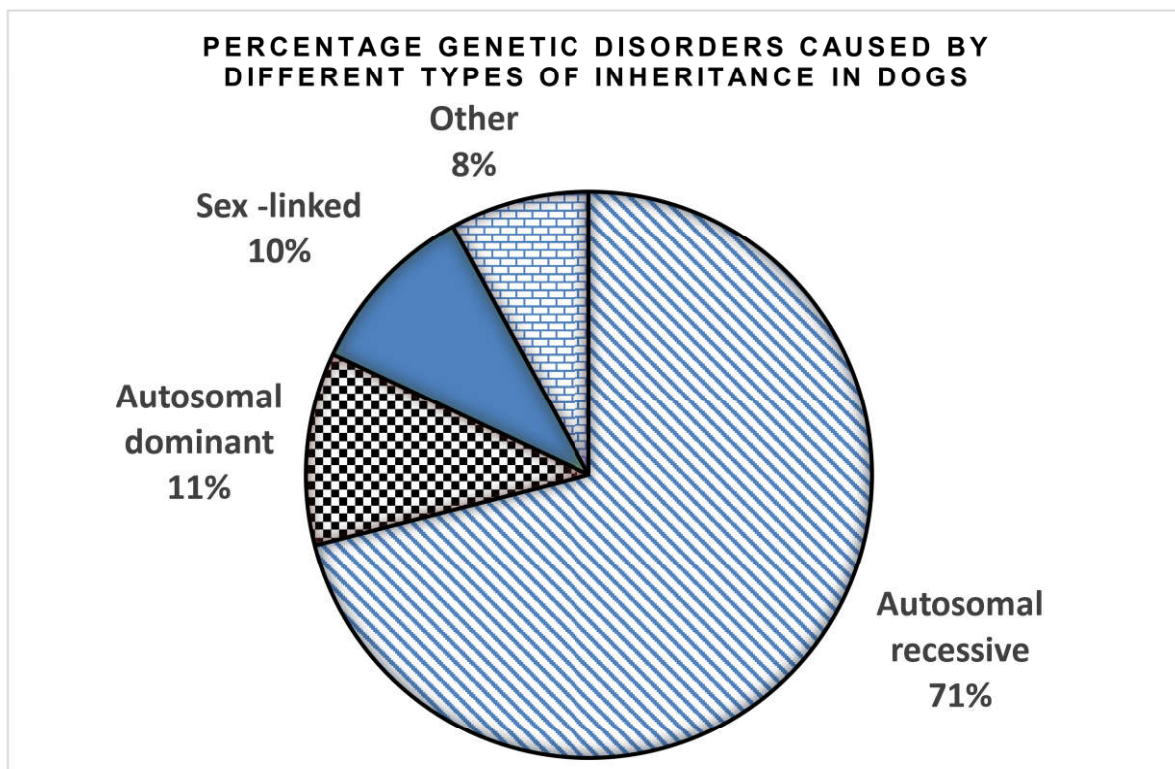
Total: $71 + 11 + 10 + 8 = 100$

Autosomal recessive: $71/100 \times 360 = 255.6^\circ$

Autosomal dominant: $11/100 \times 360 = 39.6^\circ$

Sex-linked: $10/100 \times 360 = 36^\circ$

Other: $8/100 \times 360 = 28.8^\circ$



Criteria for marking graph

CRITERIA	MARK
Pie chart drawn (T)	1
Caption showing the relationship between the two variables(H)	1
Correct calculation (C) to determine the proportions for the labelled sectors	2
Plotting of Sectors (P) Correct proportions for labelled sectors	1
1–3 sectors drawn and labelled correctly	
All 4 sectors of the graph are drawn and labelled correctly	
	2



(6)
(9)

2.6 2.6.1 (a) DNA✓ (1)

(b) Nucleolus✓ (1)

(c) tRNA✓ (1)

(d) 3✓ (1)

2.6.2 UCC✓✓ (2)

2.6.3 DNA Replication✓*

- The DNA (double helix) unwinds✓ and
- unzips✓/hydrogen bonds break
- to form two separate strands✓
- Both DNA strands serve as the templates✓
- to build a complementary DNA✓/(A to T and C to G)
- using free (DNA) nucleotides✓ from the nucleoplasm
- This results in two identical (DNA) molecules✓
- Each molecule consists of one original strand and one new strand✓

***1 Compulsory + Any 5**

(6)

- 2.6.4
- mRNA forms during transcription✓
 - by copying the coded message from DNA✓
 - and moves out of the nucleus✓
 - and attaches to the ribosome✓
 - the anticodons on the tRNA match the codons on the mRNA✓

Any (4)

(16)

[50]



QUESTION 3

3.1



- The common ancestor of the original baobab population/the baobab population of Gondwanaland was separated into two populations✓
by the **ocean/sea**✓*
- There was no gene flow between the African baobab and Australian baobab✓/two baobab populations.
- Each baobab population were exposed to different environmental conditions✓/other selection pressures.
- Natural selections occur independently✓ in each of the two baobab populations.
- Such that the individuals of the two baobab populations become very different✓ from each other.
- genotypically and phenotypically✓
- even if the two baobab populations were to mix again✓
- they will not be able to interbreed.✓
- The two baobab populations are now different baobab species (in the question) (No marks for this statement)

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

3.2

3.2.1

- They use species-specific courtship behaviour✓*
- Males sing songs to attract female mates✓
- and females do not respond/recognise songs from other males✓

***1 Compulsory + 2 (3)**

3.2.2

- Breeding at different times of the year✓
- Plant adaptations to different pollinators✓
- Producing infertile offspring✓
- Prevention of fertilisation✓

(Mark first TWO only)

Any (2)
(5)

3.3

3.3.1

B✓

(1)

3.3.2

- The pelvis is short and wide✓
 - to support the body weight of the upper body✓
- (Mark first ONE only)**

(2)



- 3.3.3 – Frees the arms✓
so that they could carry offspring✓/tools/food/manipulate things
- Allows the ability to see further✓
to spot danger✓/food
- Reduces the surface area exposed to the sun,✓
so, less heat is absorbed✓/less heat lost/improved thermoregulation
- Expose the genitals✓
to attract the opposite sex✓
- Efficient locomotion✓
allows travelling longer distances✓
- (Mark first TWO only)**



Any 2 x 2 (4)
(7)

3.4 3.4.1 Hominidae✓ (1)

3.4.2 Diagram III✓ (1)

- 3.4.3 – The foramen magnum is in a more forward position✓
– The palate is more rounded✓
(Mark first TWO only) (2)

- 3.4.4 – The jaw/palate is rectangular in Diagram II✓ and rounded in Diagram III✓
– Large spaces between the teeth in Diagram II✓ and small/no spaces between the teeth in Diagram III✓
– Large canines/teeth in Diagram II ✓ and small canines/teeth in Diagram III ✓
(Mark first THREE only) Any 3 x 2 (6)

- 3.4.5 – This organism in Diagram II had a diet of hard, raw food✓
– and the organism in Diagram III has a diet of softer✓/cooked food (2)
(12)

3.5 3.5.1 Phenotype Black short fur✓ x White long fur✓ (2)

3.5.2 Gametes BH, Bh, bH, bh✓✓ (2)

3.5.3 (a) Black Short fur; Black Long fur; White Short fur; White Long fur✓✓ (2)

(b) Black fur✓ (1)



- 3.5.4 – Because of the random arrangement of chromosomes at the equator during meiosis✓/any one of two alleles of a characteristic can sort with any two of another characteristic the alleles of different genes move independently of each other into the gametes✓
They can therefore appear in the gametes in different combinations✓



(3)
(10)

- 3.6 3.6.1 – Females lay many eggs✓ which will ensure that the ratios obtained will be reliable✓
– The eggs develop very quickly✓/7 to 14 days therefore, results will be obtained fast✓
– Can clearly differentiate between male and female✓ making it easy to breed✓
– Fruit flies survive and breed in small flasks✓ making it easy to observe and work with✓
– The food medium required is simple✓/cheap making it easy/cheap to conduct the investigation✓
(Mark first TWO only) (Any 2 x 2) (4)



3.6.2 P₁ Phenotype: White-eyed male x red-eyed female✓

Genotype: X^rY x X^RX^R ✓

Meiosis

G/gametes

X^r, Y X^R, X^R ✓



Fertilisation



F₁ Genotype X^RX^r X^RX^r X^RY X^RY ✓

Phenotype: 2 red-eyed males : 2 red-eyed females
1 red eyed male : 1 red-eyed female✓*

P₁ and F₁ ✓

Meiosis and fertilisation ✓

(*1 Compulsory + Any 5)

OR

P₁ Phenotype: White-eyed male x Red-eyed female✓

Genotype: X^rY x X^RX^R ✓

Meiosis

Fertilisation

Gametes	X ^R	X ^R
X ^r	X ^R X ^r	X ^R X ^r
Y	X ^R Y	X ^R Y

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

F₁ Phenotype: 2 red-eyed males: 2 red-eyed females
1 red-eyed male: 1 red-eyed female✓*

P₁ and F₁ ✓

Meiosis and fertilisation ✓

(*1 Compulsory + Any 5) (6)

(10)

[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150