



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 ✓
(b) Effect of antibiotics ✓ | | (1)
(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✓

Any

(5)

(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

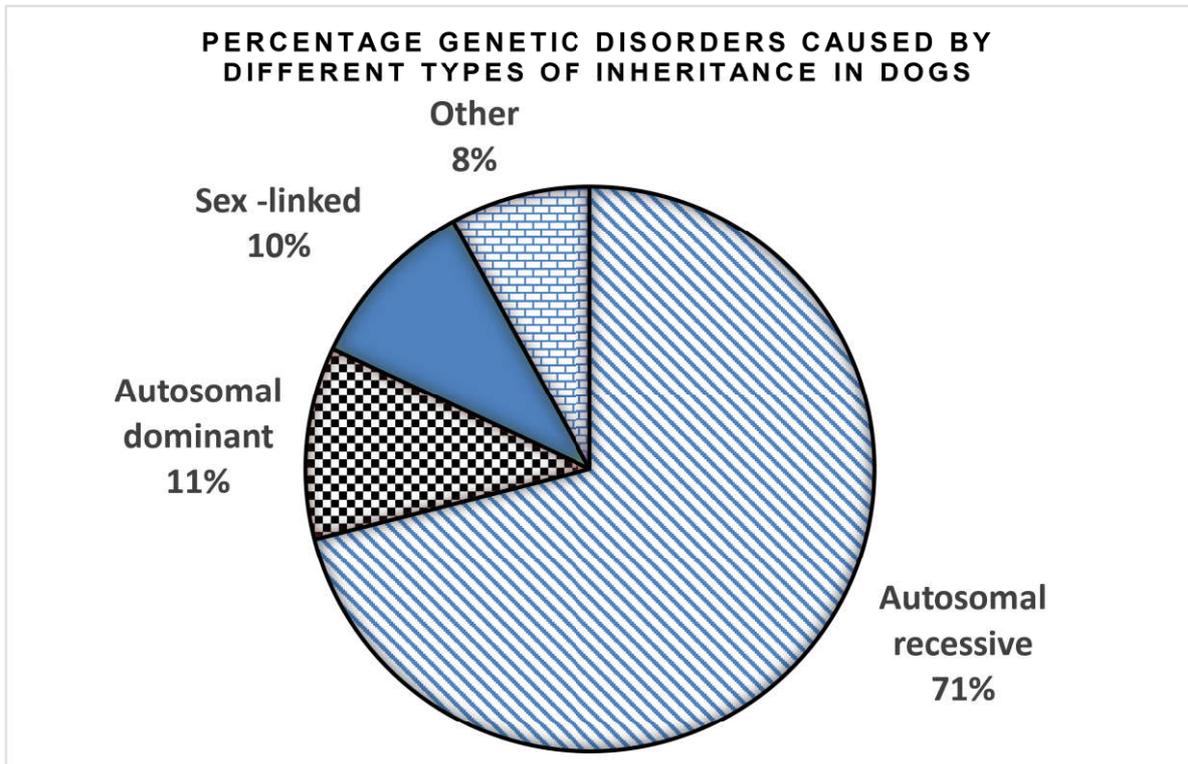
Total: $71 + 11 + 10 + 8 = 100$

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 ✓

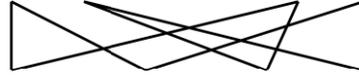


Meiosis

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