



# education

Department:  
Education  
North West Provincial Government  
**REPUBLIC OF SOUTH AFRICA**

## NATIONAL SENIOR CERTIFICATE

**GRADE 12**

**LIFE SCIENCES P2  
SEPTEMBER 2023  
MARKING GUIDELINES**

**MARKS: 150**

**These marking guidelines 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 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. Marking guidelines 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 is applicable 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 the 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

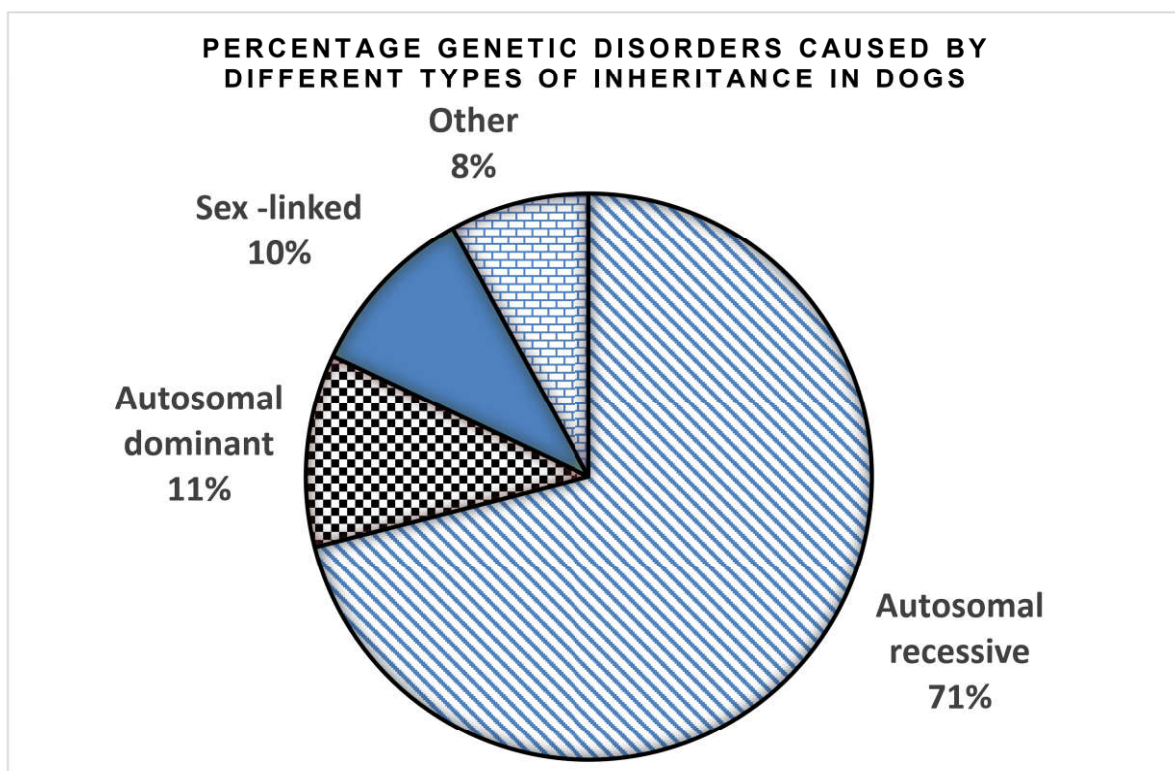
Total:  $71 + 11 + 10 + 8 = 100$

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 <b>showing the relationship between the two variables(H)</b>	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)**

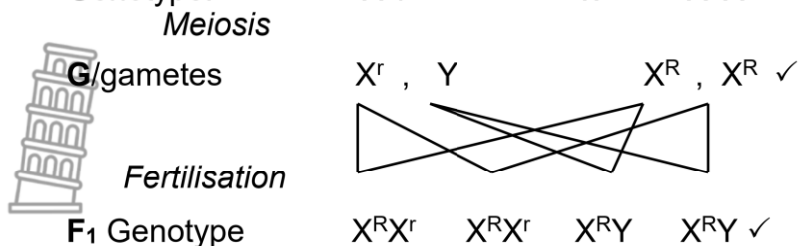
(Any 2 x 2)

(4)



**P<sub>1</sub> Phenotype:** White-eyed male x red-eyed female✓

**Genotype:**  $X^rY$  x  $X^RX^R$  ✓



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

P<sub>1</sub> and F<sub>1</sub> ✓

Meiosis and fertilisation ✓

(\*1 Compulsory + Any 5)

**OR**

**P<sub>1</sub> Phenotype:** White-eyed male x Red-eyed female✓

**Genotype:**  $X^rY$  x  $X^RX^R$  ✓

*Meiosis*

*Fertilisation*

Gametes	$X^R$	$X^R$
$X^r$	$X^RX^r$	$X^RX^r$
Y	$X^RY$	$X^RY$

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

**F<sub>1</sub> Phenotype:** 2 red-eyed males: 2 red-eyed females  
1 red-eyed male: 1 red-eyed female✓\*

P<sub>1</sub> and F<sub>1</sub> ✓

Meiosis and fertilisation ✓

(\*1 Compulsory + Any 5) (6)  
(10)  
[50]

**TOTAL SECTION B: 100**  
**GRAND TOTAL: 150**