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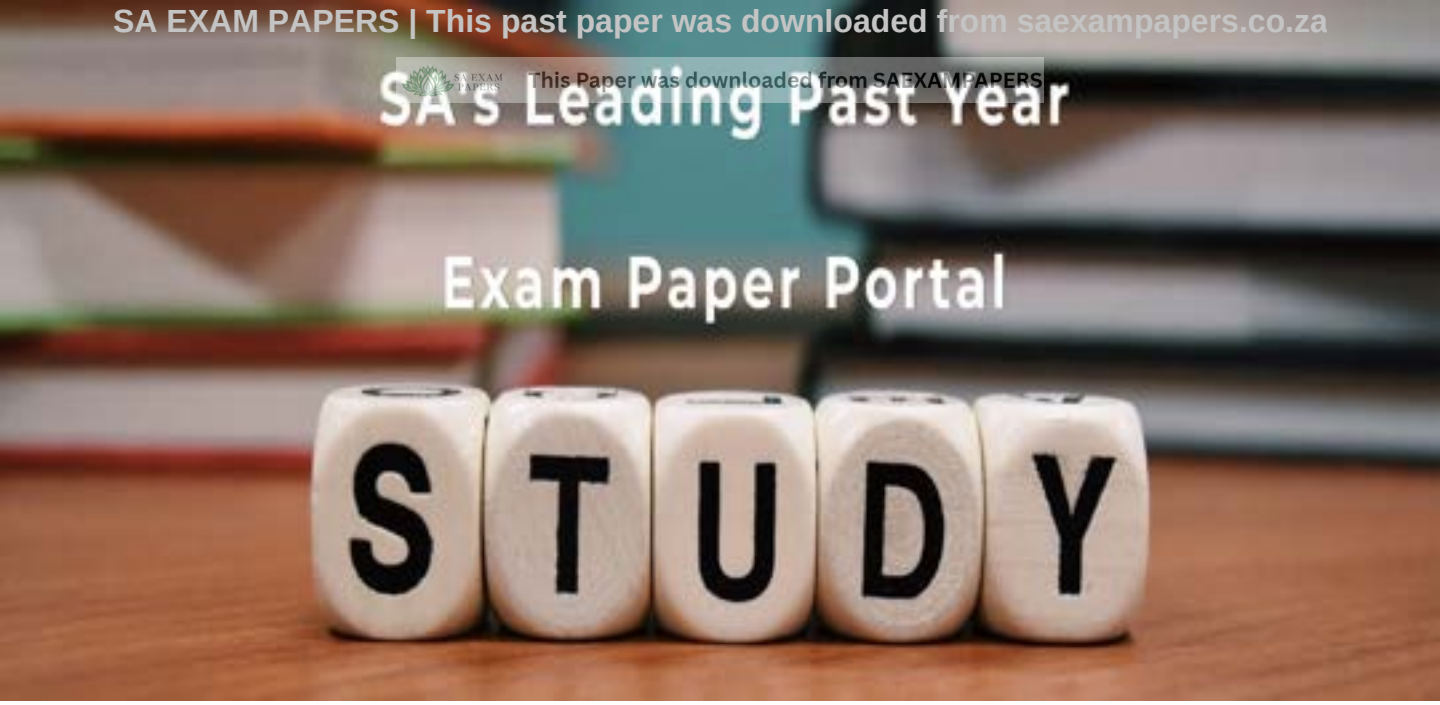


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Department of Education
FREE STATE PROVINCE

# PREPARATORY EXAMINATION

## GRADE 12

# LIFE SCIENCES P2

## SEPTEMBER 2025

## MARKS: 150

## MARKING GUIDELINES

**These marking guidelines consist of 12 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 | B ✓✓ | | |
| | 1.1.2 | B ✓✓ | | |
| | 1.1.3 | A ✓✓ | | |
| | 1.1.4 | B ✓✓ | | |
| | 1.1.5 | A ✓✓ | | |
| | 1.1.6 | C ✓✓ | | |
| | 1.1.7 | B ✓✓ | | |
| | 1.1.8 | C ✓✓ | | |
| | 1.1.9 | A ✓✓ | | |
| | 1.1.10 | C ✓✓ | | |
| | | | (10 x 2) | **(20)** |
| 1.2 | 1.2.1 | Sex-linked ✓ | | |
| | 1.2.2 | Theory ✓ | | |
| | 1.2.3 | Monohybrid ✓ cross | | |
| | 1.2.4 | Interphase ✓ | | |
| | 1.2.5 | Incomplete ✓ | | |
| | 1.2.6 | Telophase 1 ✓ | | |
| | 1.2.7 | (Gene) Mutation ✓ | | |
| | 1.2.8 | Hemophilia ✓ | | |
| | 1.2.9 | Biogeography ✓ | | |
| | 1.2.10 | Darwinism ✓ | | |
| | | | (10 x 1) | **(10)** |
| 1.3 | 1.3.1 | BOTH A and B ✓✓ | | |
| | 1.3.2 | A ONLY ✓✓ | | |
| | 1.3.3 | A ONLY ✓✓ | | |
| | | | (3 x 2) | **(6)** |
| 1.4 | 1.4.1 | a) Nuclear membrane ✓ / Nucleus | | (1) |
| | | b) Polypeptide ✓ / protein | | (1) |
| | 1.4.2 | a) O ✓ | | |
| | | b) L ✓ | | |
| | | c) M ✓ | | (3) |
| | 1.4.3 | TTA ✓✓ | | (2) |
| | 1.4.4 | Leucine, Glutamine (correct order) ✓✓ / Leu, Glu | | (2) |
| | | | | **(9)** |

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| | | | |
|---|---|---|---|
| 1.5 | 1.5.1 | (Robert) Broom ✓ | (1) |
| | 1.5.2 | *Australopithecus africanus* ✓ | (1) |
| | 1.5.3 | Taung child ✓ (NOT baby) | (1) |
| | 1.5.4 | (Lee) Berger ✓ / Burger | (1) |
| | 1.5.5 | *Australopithecus sediba* ✓ | (1) **(5)** |

**TOTAL SECTION A: 50**

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## SECTION B

## QUESTION 2

2.1 2.1.1 (Cheek) epithelial ✓ tissue (1)

2.1.2
- DNA- profile bars of victim ✓
- were compared ✓ to
- DNA-profile bars from toothbrush ✓/hairbrush /clothing samples provided by family members
- If ALL the DNA bars /lines /stripes were the same, ✓ the person was identified. (4)

2.1.3 (Victim's) parents ✓ (1)

2.1.4
- The victim will share NO /FEW DNA bars/stripes /lines with their spouse ✓
- ALL the DNA bars /stripes /lines that do not match their mother ✓ will match their father ✓ (3)

2.1.5
- Double stranded ✓
- Helix shaped ✓
- Nucleotides ✓consist out of deoxyribose, ✓ phosphate ✓ and a nitrogen base ✓/ T, C, G and A
- Nitrogen bases pair in complimentary manner ✓/A pairs with T and G pair with C / T=A; G=C
- Nitrogen bases bind with a hydrogen bond ✓ **(any 6)** (6)

**(15)**

2.2 2.2.1 Metaphase II (1)

2.2.2 It contracts/ shortens ✓ pulling the chromatid ✓/daughter chromosomes toward the (opposite) poles ✓ **(any 2)** (2)

2.2.3 a) 2 ✓ (1)
b) 4 ✓ (1)
c) 4 ✓ (1)

2.2.4
- Single ✓/ Individual chromosomes
- from a single row ✓
- on the equator ✓
- spindle fibres attach to the centromeres ✓ **(any 3)** (3)

2.2.5 - An organism possesses two 'factors' ✓
- which separate or segregate ✓ during meiosis
- so that each gamete contains only one of these 'factors' ✓ (3)

**(12)**

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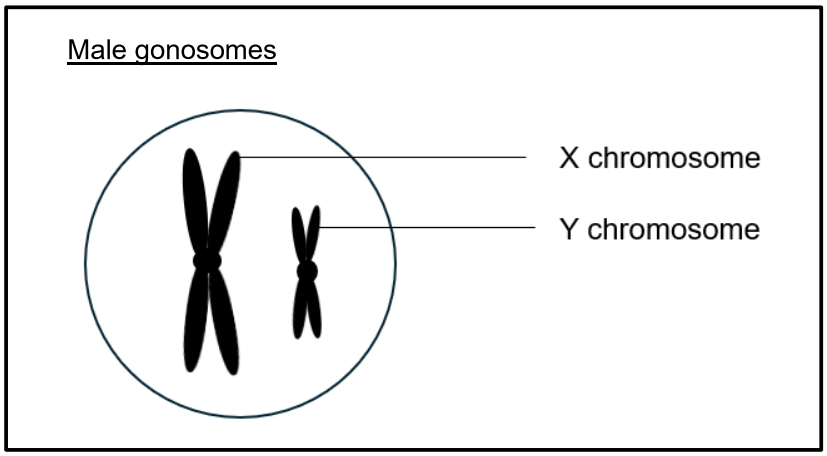
2.3 2.3.1 The father ✓ /male /man (1)

2.3.2




| Criteria | Elaboration | Mark |
|---|---|---|
| Heading **(H)** | Descriptive heading: refers to male gonosomes | 1 |
| Diagram **(D)** | One large X chromosome and one small Y chromosome | 1 |
| Labels **(L)** | Any ONE correct label<br>Chromatid, centromere, X-chromosome, Y- chromosome | 1 |

(3)

2.3.3
- Henry's gametes/sperm cells have one X-chromosome or one Y-chromosome ✓
- Ann and Catherine's gametes/ova have only X-chromosomes ✓
- If an ovum is fertilised by an X bearing sperm, a female/ girl will form ✓
- If an ovum is fertilised by a Y bearing sperm, a boy/male is formed ✓

(4)
**(8)**

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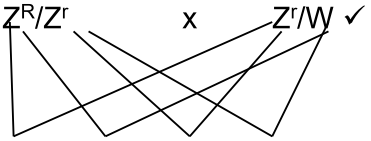
2.4 $P_1$ Phenotype Red feathered male x Black feathered female ✓

Genotype $Z^R Z^r$ x $Z^r W$ ✓

*Meiosis*

Gametes $Z^R/Z^r$ x $Z^r/W$ ✓

*Fertilisation*



$F_1$ Genotype $Z^RZ^r$ $Z^RW$ $Z^rZ^r$ $Z^rW$ ✓

Phenotype Male with red feathers, male with black feathers, female with red feathers, female with black feathers ✓

1:1:1:1 ✓ *

$P_1$ and $F_1$ ✓
Meiosis and fertilisation ✓

***1 compulsory mark** + any 5

**OR**

$P_1$ Phenotype Red feathered male x Black feathered female ✓

Genotype $Z^R Z^r$ x $Z^r W$ ✓

*Meiosis*

| Gametes | $Z^R$ | $Z^r$ |
|---|---|---|
| $Z^r$ | $Z^RZ^r$ | $Z^rZ^r$ |
| W | $Z^RW$ | $Z^rW$ |

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

Phenotype Male with red feathers, male with black feathers, female with red feathers, female with black feathers ✓

1:1:1:1 ✓ *

$P_1$ and $F_1$ ✓
Meiosis and fertilisation ✓

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

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| | | | |
|---|---|---|---|
| 2.5 | 2.5.1 | a) Wrinkled leaves, purple flowers ✓✓ | (2) |
| | | b) ddee ✓✓/ eedd (NOT eded) | (2) |
| | | c) (Plant) **B** ✓✓ | (2) |
| | 2.5.2 | 4 ✓/ four | (1) |
| | 2.5.3 | 25% ✓✓ | (2) |
| | | | **(9)** |
| | | | **[50]** |

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## QUESTION 3

3.1 3.1.1 Cloning ✓ (1)

3.1.2 Desired characteristics ✓ / genes / genetic material
Of somatic cell ✓/ diploid chromosome count / 2n (2)

3.1.3
- The diploid nuclei were removed from the ear cell ✓,
- The receiver cells were egg cells/ova from domestic goats ✓
- Nuclei of ova were removed ✓
- The diploid nuclei of the Bucardo /Celia were ✓
- transferred into the ova of the domestic goats ✓
- The ova were stimulated to divide through mitosis ✓
- Zygotes developed into embryos ✓
- Embryos were implanted into surrogate goats ✓ (**any 6**) (6)

3.1.4 They took the 7 embryos that resulted in pregnancies ✓
Divide the number of implanted embryos ✓/ 57
Multiply by 100 ✓
(No marks for a mathematical calculation. The question is DESCRIBE.) (3)
**(12)**

3.2 3.2.1 Phylogenetic tree ✓ /cladogram (1)

3.2.2 4 ✓ (1)

3.2.3 a) *Ardipithecus ramidus* ✓ (1)
b) *Paranthropus robustus* ✓ (1)

3.2.4
- Cultural ✓
- Genetic ✓
- Fossil ✓ (**any 2**) (2)

3.2.5 *Homo habilis* ✓ (1)

3.2.6 *Homo habilis* was found in Africa ONLY ✓
OLDEST fossils of *Homo erectus* and *Homo sapiens* found in Africa ✓
YOUNGER *Homo* fossils found in other parts of the world ✓ (3)

3.2.7
- More forward position of the foramen magnum ✓ – develop ability to walk on two feet ✓ /bipedalism
- Larger cranium ✓ /more rounded cranium – increase in brain size ✓ /more intelligent

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- Flatter face ✓/less sloping forehead /non-prognathous /more develop chin / smaller canines / no diastema / prominent brow ridge – due to softer food ✓/smaller muscles for chewing
- Well developed chin ✓ - development of speech ✓
- S-shaped spine ✓ - absorb shock ✓when walking on two legs
- Pelvis is short and wide ✓ - to carry the weight ✓ of the upper body when walking on two legs (6)

3.3 3.3.1 Type of inheritance ✓ (1)

3.3.2 Same breed of dog ✓/ Dobermans were used ✓
Sample of 5 ml of blood was used ✓ (2)

3.3.3 Genetic disorders are not affected by age ✓
Genetic disorders are inherited ✓/ born with the condition
Will be affected for their whole life ✓ **(any 2)** (2)

3.3.4 The allele for the genetic disorder will mask the effect of the allele without the disorder ✓
There are 76 autosomes ✓ on which the autosomal genetic disorder can occur
There are only 2 gonosomes ✓on which the sex-linked genetic disorder can occur

**OR**

The allele for the genetic disorder will mask the effect of the allele without the disorder ✓
Autosomal: 76/78 x 100 = 97%
Sex-linked: 2/78 x 100 = 2,5% (3)

3.3.5 71/100 x 360° = 255,6
11/100 x 360° = 39,6
10/100 x 360° = 36
8/100 x 360° = 28,8

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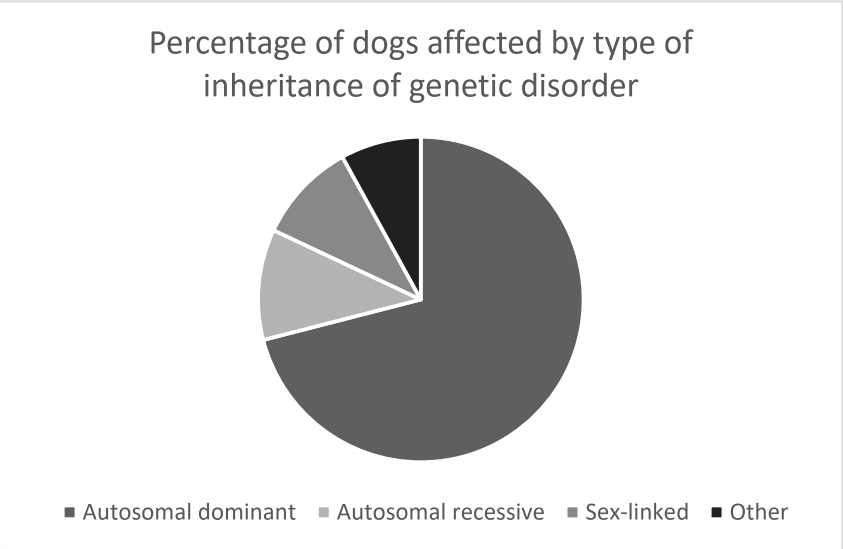


(6)
**(14)**

Rubric for marking graph

| **Criteria** | **Elaboration** | **Marks** |
|---|---|---|
| Type **(T)** | Pie graph | 1 |
| Heading **(H)** | Both variables included | 1 |
| Calculations **(C)** | One to three segments were correctly calculated<br>All four segments were correctly calculated | 1<br>2 |
| Plotting **(P)** **(Don't measure, judge at a glance)** | One to three segments correctly plotted and labelled<br>All four segments correctly plotted and labelled | 1<br>2 |

3.4.1 There was variation in the production of amylase in the grey wolf specie ✓
Some grey wolves had the genes to produce amylase, and others did not have these genes ✓
When wolves started to scavenge human food ✓ /when competition occurred
The animals with the ability to digest starch survived and reproduced ✓
And the animals without the ability to digest starch died ✓
The allele to produce amylase was passed on to the offspring ✓
A greater proportion of the wolves/dogs in the next generation had the ability to digest starch (6)

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3.4.2 All dog breeds are genetically similar ✓
Can reproduce and produce fertile offspring ✓ (2)
**(8)**
**[50]**

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

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