GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

JUNE EXAMINATION
GRADE 12

2023

MARKING GUIDELINES

LIFE SCIENCES

12 pages

PRINCIPLES RELATING TO THE MARKING OF LIFE SCIENCES

1. **If more information than marks allocated is given**
   Stop marking when the maximum marks are reached and place a wavy line and 'max' in the right-hand margin.

2. **If, for example, three reasons are required and five are given**
   Mark only the first three irrespective of whether all or some are correct/incorrect.

3. **If whole process is given when only part of it is required**
   Read all and credit relevant part.

4. **If comparisons are asked for and descriptions are given**
   Accept if 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 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 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 answer if correct.

10. **Wrong numbering**
    If answer fits into the correct sequence of questions but incorrectly numbered, it is acceptable.

11. **If language used changes the intended meaning**
    Do not accept.

12. **Spelling errors**
    If recognisable, accept, provided it does not mean something else in Life Sciences or if it is out of context.

13. **If common names given in terminology**
Accept, provided it was accepted at the memo discussion meeting.

14. **If only letter is asked for and only 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 in a different way.**

17. **Caption**
All illustrations (diagrams, graphs, tables, etc.) must have a caption.

18. **Code-switching of official languages (terms/concepts)**
A single word or two that appears in any official language other than the learners' 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 marking guidelines**
No changes must be made to the marking guidelines without consulting the provincial internal moderator.

SECTION A

QUESTION 1

1.1 1.1.1 C ✓✓

1.1.2 A ✓✓

1.1.3 C ✓✓

1.1.4 D ✓✓

1.1.5 B ✓✓

1.1.6 A ✓✓

1.1.7 B ✓✓ (7 x 2) **(14)**

1.2 1.2.1 Autonomic ✓ Nervous System

1.2.2 Nucleotide(s) ✓

1.2.3 Luteinising Hormone/LH ✓

1.2.4 Transcription ✓

1.2.5 Down Syndrome ✓/Trisomy 21

1.2.6 Haemophilia ✓

1.2.7 Mitochondrial ✓ DNA/mtDNA (7 x 1) **(7)**

1.3 1.3.1 A only ✓✓

1.3.2 A only ✓✓

1.3.3 None ✓✓ (3 x 2) **(6)**

1.4 1.4.1 DNA profile ✓ (1)

1.4.2 No ✓ (1)

1.4.3 Suspect 2 ✓ (1)

1.4.4
- Paternity testing ✓/establishing family relations
- Identifying dead persons ✓
- Identifying genetic disorders ✓
- Matching tissue for organ transplants ✓
- Tracing missing persons ✓

(Mark first TWO only.) Any (2)
(5)

1.5 1.5.1 (a) E ✓ – Cerebellum ✓ (2)
(b) F ✓ – Medulla oblangata ✓ (2)
(c) D ✓ – Cerebrum ✓ (2)

1.5.2 Reflex action ✓ (1)

1.5.3 (a) Ventral ✓ root (1)
(b) Dorsal ✓ root (1)

1.5.4 B ✓ C ✓ A ✓ (3)
(12)

1.6 1.6.1 Oviparous✓/Ovipary (1)

1.6.2 The eggs are laid ✓
outside the female body. ✓ (2)

1.6.3 5 x 100 = 500
500 ✓ x $^{10}/_{100}$ ✓
= 50 ✓ survive (3)
(6)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 2.1.1 (a) Ovum ✓ (1)

(b) Morula ✓ (1)

2.1.2 Placenta ✓ (1)

2.1.3 Fertilisation ✓ the nucleus of the sperm fuses with the nucleus of the ovum. ✓ (2)

2.1.4
- An infection of the fallopian tubes ✓
- The development of scar tissue from a previous infection ✓
- A surgical procedure in the fallopian tubes ✓
- Previous surgery in the pelvic area ✓

(Mark first ONE only.) Any (1)

2.1.5
- Diagram 1 – implantation of blastocyst in the endometrium ✓/uterus which leads to a viable/normal pregnancy. ✓
- Diagram 2 – implantation in the fallopian tubes ✓ which is an ectopic pregnancy ✓/non-viable pregnancy. (4)

2.1.6
- Embryo cannot be sustained/nourished ✓
- and it will not survive. ✓

OR

- Can cause the fallopian tube/part of the reproductive system to rupture ✓
- which can lead to bleeding/death of mother. ✓

OR

- Fallopian tubes become damaged ✓
- makes it harder to fall pregnant again ✓/increased chances of future ectopic pregnancies.

(Mark first ONE only.) (2)

(12)

2.2 2.2.1 **A gene** is a portion of DNA that codes for a characteristic/protein. ✓
An allele is a different form of the same gene ✓ which occurs at the same locus on homologous chromosomes. (2)

2.2.2 **P1** Phenotype Curled ears × Curled ears ✓
Genotype Rr × RR ✓

Meiosis

Fertilisation

Gametes	R	r
R	RR	Rr
R	RR	Rr

1 mark for correct gametes

F1 Genotype: 50% Rr : 50% RR ✓*
Phenotype: 100% Curled ear ✓*

P1 & F1 ✓
Meiosis and fertilisation ✓

P1 Phenotype Curled ears × Curled ears ✓
Genotype Rr × RR ✓

Meiosis

Gametes R; r × R; R ✓

Fertilisation



F1 Genotype RR; Rr; RR; Rr

50% Rr : 50% RR ✓*

Phenotype: 100% Curled ear ✓*

P1 & F1 ✓
Meiosis and fertilisation ✓

***2 compulsory** marks + any 4 (6)
(8)

2.3 2.3.1 Spermatogenesis ✓ (1)

2.3.2 Testes ✓ (1)

2.3.3 (a) 23 ✓ (1)
(b) 23 ✓ (1)

2.3.4 Crossing over✓
Random arrangement✓ of chromosomes (2)

2.3.5

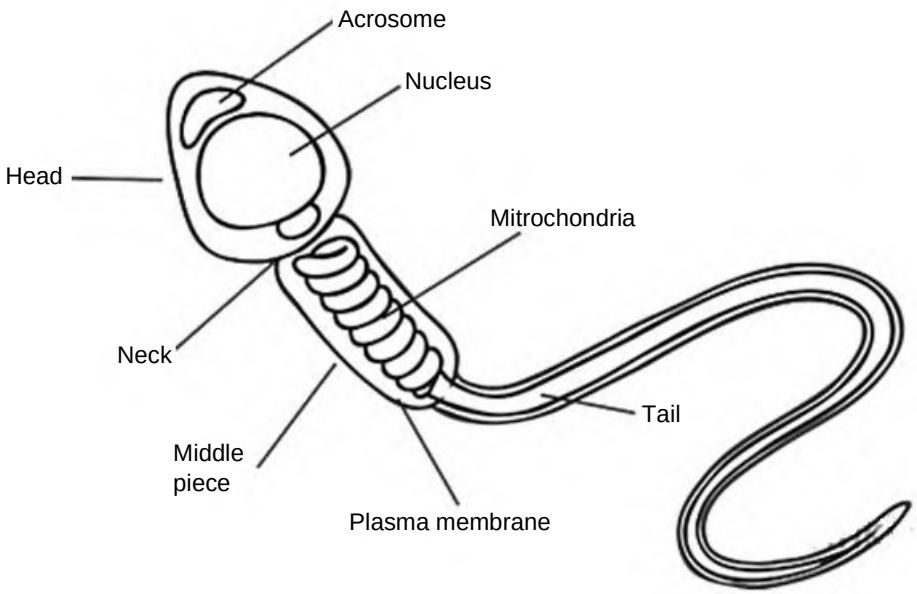


Diagram of a sperm cell

CRITERIA		ELABORATION	MARK
Caption	**(C)**	Includes the word sperm.	1
Drawing	**(D)**	Correct proportion of parts. Shape is accurate.	1
Label	**(L)**	1 Correct label 2 Correct labels 3 Correct labels	1 2 3

(5)
(11)

2.4 2.4.1
- Pupillary mechanism* ✓/Pupillary reflex
- in bright light ✓
- Circular muscles of the iris contract ✓
- Radial muscles of the iris relax ✓
- The pupil constricts ✓
- Less light enters the eye ✓

***1 compulsory** mark + any 4 (5)

2.4.2 Lens/B becomes more convex ✓
to accommodate light coming from less than 6 m ✓/for near vision. (2)

2.4.3
- Suspensory ligaments ✓
- Ciliary muscle ✓

(Mark first TWO only.) (2)

2.4.4 Long-sightedness ✓/Hypermetropia (1)
(10)

2.5 2.5.1 Dihybrid ✓ cross (1)

2.5.2 It is a cross with two traits. ✓ (1)

2.5.3 FfBb ✓ and FfBb ✓
or
FfBb for both parents ✓✓ (2)

2.5.4 (a) Freckles and blue eyes ✓✓ (2)
(b) ffBB ✓✓ (2)

2.5.5 $\frac{3}{4}$ ✓ (1)
(9)
[50]

QUESTION 3

3.1 3.1.1 **Translation*** ✓
- Each tRNA carries a specific amino acid ✓
- when the anticodon on the tRNA ✓
- matches the codon on the mRNA ✓
- then tRNA brings the required amino acid to the ribosome. ✓
- Amino acids then become attached by peptide bonds ✓
- to form the required protein. ✓

***1 compulsory** mark + any 4 (5)

3.1.2 Cytoplasm ✓ /Ribosome (1)

3.1.3 (a) mRNA ✓ (1)
(b) tRNA ✓ (1)

3.1.4 Histidine ✓ – Glycine ✓ – Methionine ✓ (3)

3.1.5 The DNA changes from GTA to GAA. ✓
The new amino acid will be Leucine ✓ instead of Histidine. (2)
(13)

3.2 3.2.1 3 ✓ (1)

3.2.2 I^BI^B ✓, I^Bi ✓ (2)

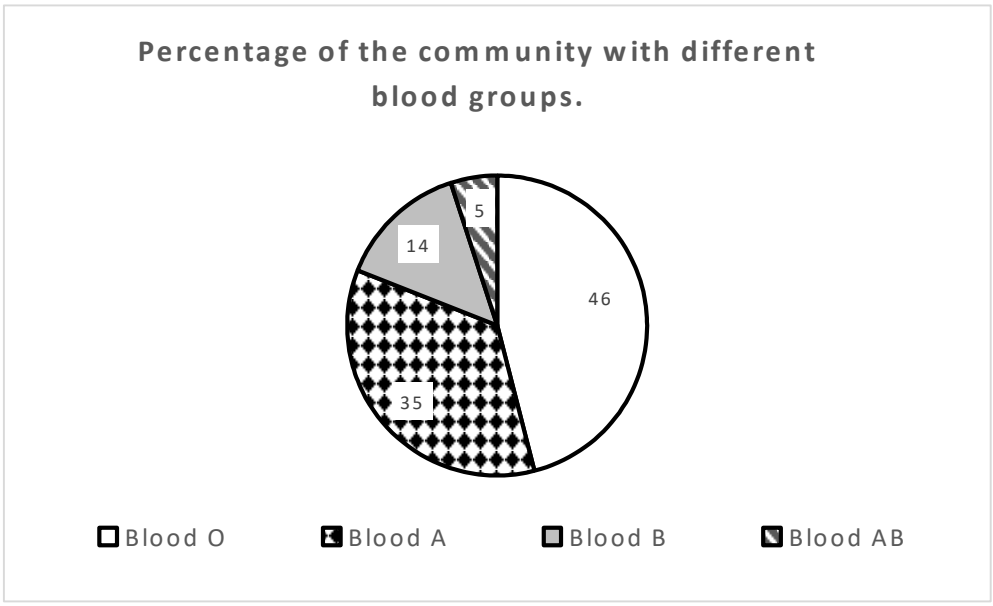
3.2.3 Complete dominance ✓
The allele for blood type A/I^A is dominant over the allele for blood type O/i. ✓ (2)

3.2.4 $\frac{46}{100} \times 360° = 165,6°/166°$

$\frac{35}{100} \times 360° = 126°$

$\frac{14}{100} \times 360° = 50,4°/50°$

$\frac{5}{100} \times 360° = 18°$



Rubric for assessment of the graph:

CRITERIA		ELABORATION	MARK
Type graph	**(T)**	Pie chart with 4 sectors. Drawn with a compass, not freehand.	1
Caption/Heading	**(H)**	Includes blood group AND percent of the community.	1
Calculation	**(C)**	1 – 3 angles correctly calculated. All 4 angles correctly calculated.	1 2
Drawing	**(D)**	Correct proportions for 1 – 2 of the labelled sectors. Correct proportions for ALL 4 of the labelled sectors.	1 2

(6)
(11)

3.3 3.3.1 Anaphase 1 ✓ (1)

3.3.2
- Spindle fibres contract ✓
- (Homologous) pairs of chromosomes separate ✓/replicated chromosomes are pulled
- to the opposite poles. ✓

Any (2)

3.3.3 (a) Centriole ✓/Centrosome (1)
(b) Spindle fibre ✓ (1)

3.3.4
- Four daughter cells are produced ✓
- after cytokinesis ✓ is completed.
- Each cell has a haploid set of chromosomes. ✓
- The daughter cells are genetically different. ✓
- The nuclear membrane reappears ✓
- and the nucleolus reappears. ✓

Any (4)
(9)

3.4 3.4.1 (a) Corpus luteum ✓ (1)
(b) Placenta ✓ (1)

3.4.2 FSH ✓/Follicle Stimulating Hormone (1)

3.4.3
- The progesterone levels remain high ✓
- this maintains pregnancy ✓
- and will inhibit/decrease the secretion of FSH. ✓
- Follicles will not be stimulated to develop. ✓
- Menstruation will stop. ✓

Any (4)

3.4.4 High levels of LH ✓
after ovulation ✓
cause the empty follicle ✓ to become a corpus luteum. Any (2)
(9)

3.5 3.5.1 (a) gender ✓ (1)
(b) reaction time ✓ (1)

3.5.2
- A sample of 5 girls and 5 boys were used. ✓
- The trial was repeated 5 times for each gender. ✓

(Mark first ONE only.) Any (1)

3.5.3 Same:
- ruler used ✓
- age group ✓
- time of day ✓
- environmental condition ✓

(Mark first TWO only.) Any (2)

3.5.4 Girls have a faster reaction time✓ than boys/boys have a slower reaction time. (1)

3.5.5 Increases validity ✓✓ (2)
(8)
[50]

TOTAL SECTION B: 100

TOTAL: 150