



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 oblongata ✓ (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 $5 \times 100 = 500$
 $500 \times \frac{10}{100} = 50$ ✓ 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 ✓*

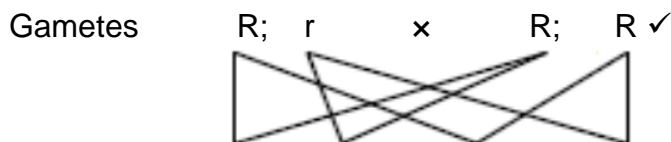
P1 & F1 ✓

Meiosis and fertilisation ✓

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

Meiosis

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

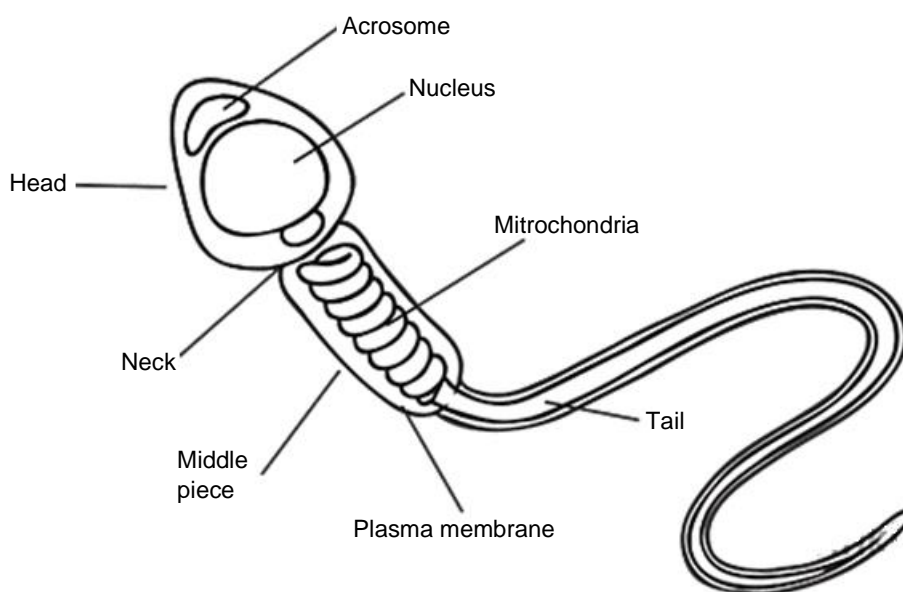


Diagram of a sperm cell

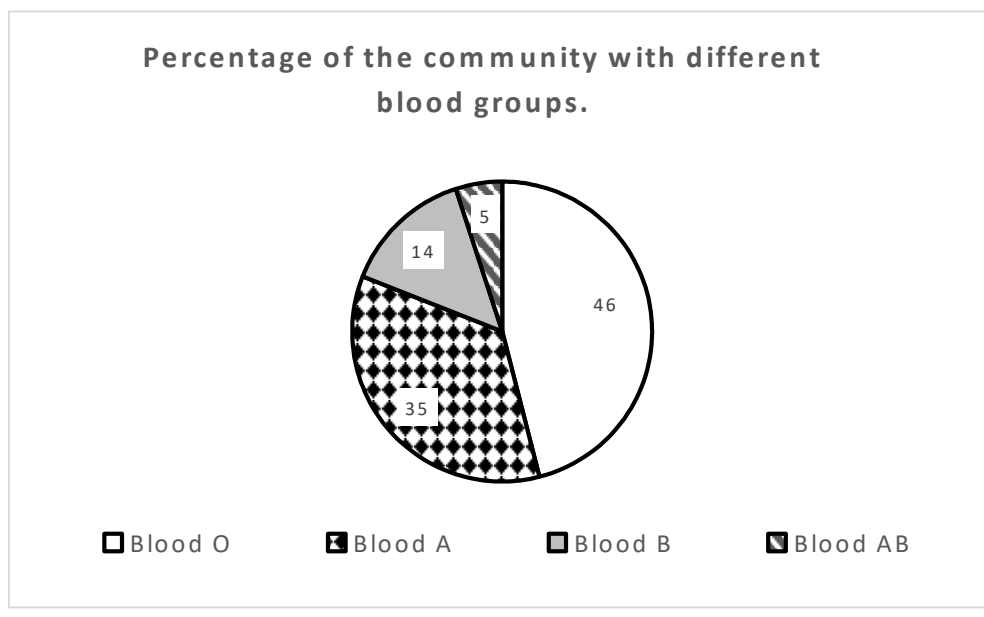
CRITERIA	ELABORATION	MARK
Caption (C)	Includes the word sperm.	1
Drawing (D)	Correct proportion of parts. Shape is accurate.	1
Label (L)	1 Correct label	1
	2 Correct labels	2
	3 Correct labels	3

(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 $I^B I^B$ ✓, $I^B i$ ✓ (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 $\frac{46}{100} \times 360^\circ = 165,6^\circ/166^\circ$
- $\frac{35}{100} \times 360^\circ = 126^\circ$
- $\frac{14}{100} \times 360^\circ = 50,4^\circ/50^\circ$
- $\frac{5}{100} \times 360^\circ = 18^\circ$



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 <u>blood group</u> AND <u>percent of the community</u> .	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 ✓ (b) Placenta ✓		(1) (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 ✓ (b) reaction time ✓		(1) (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