

GAUTENG PROVINCE

REPUBLIC OF SOUTH AFRICA

**JUNE EXAMINATION
GRADE 12**

2023

MARKING GUIDELINES

LIFE SCIENCES

12 pages

Please note, the paper is out of 148 not 150. Change the raw mark total on SASAMS from 150 to 148.

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) Question removed (2)
 (c) D ✓ – Cerebrum ✓ (1)
- 1.5.2 Reflex action ✓ (1)
- 1.5.3 (a) Ventral ✓ root (1)
 (b) Dorsal ✓ root (3)
- 1.5.4 B A ✓✓✓/ B✓C✓A✓ (10)
- 1.6 1.6.1 Oviparous✓/Ovipary (1)
- 1.6.2 The development of the embryos is in eggs✓
 The eggs are laid ✓
 outside the female body. ✓ Any (2)
- 1.6.3 $5 \times 100 = 500$
 $500 \checkmark \times \frac{10}{100} \checkmark$ OR $500 \checkmark \times 10\% \checkmark$ (3)
 $= 50 \checkmark$ survive (6)
- ~~500~~ $500/100 = 500$
 $500 \div 10$
 $= 50$
- TOTAL SECTION A: 48

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 a non-viable pregnancy ✓/abnormal pregnancy. (4)
- 2.1.6 CAUSE: Embryo cannot be sustained ✓/nourished
 EFFECT: and it will not survive. ✓

OR

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

OR

CAUSE: Fallopian tubes become damaged ✓
 EFFECT: makes it harder to fall pregnant again ✓/increased chances of future ectopic pregnancies. (2)
 (Mark first ONE only) (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 ✓

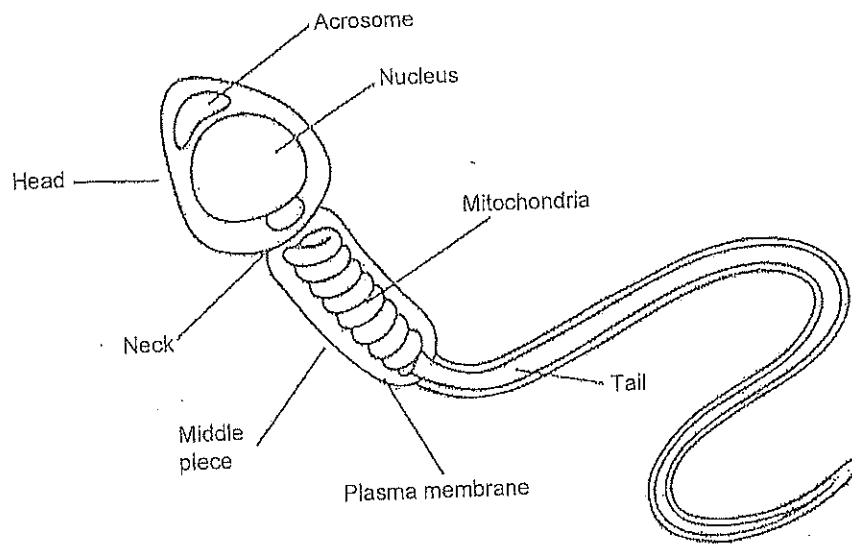
P ₁	Phenotype	Curled ears	x	Curled ears ✓
	Genotype	Rr	x	RR ✓
Meiosis	Gametes	R; r	x	R; R ✓
Fertilisation	Genotype	RR; Rr; RR; Rr		
F ₁				
				50% Rr : 50% RR ✓*
	Phenotype:			100% Curled ear ✓*

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 ✓ (2)
- Random arrangement ✓ of chromosomes

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

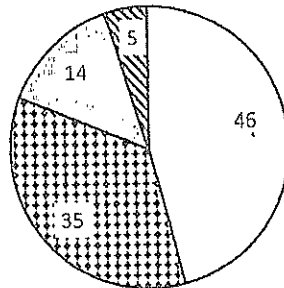
(5)
(11)

- 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 (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 (2)
 FfBb✓✓ for both parents (2)
- 2.5.4 (a) Freckles and blue eyes ✓✓ (2)
 (b) ffBB ✓✓ (2)
- 2.5.5 $\frac{3}{4}$ ✓ OR $\frac{7}{8}$ ✓ (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. ✓ (2)
 The new amino acid will be Leucine ✓ instead of Histidine. (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 O: $\frac{46}{100} \times 360^\circ = 165,6^\circ/166^\circ$
 A: $\frac{35}{100} \times 360^\circ = 126^\circ$
 B: $\frac{14}{100} \times 360^\circ = 50,4^\circ/50^\circ$
 AB: $\frac{5}{100} \times 360^\circ = 18^\circ$

Percentage of the community with different blood groups.



□ Blood O

▨ Blood A

▩ Blood B

▤ Blood AB

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 ✓
 - Whole chromosomes are pulled to the opposite poles. ✓

Any

(2)

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

(1)

(1)

- 3.3.4 - Four daughter cells are produced ✓
 - after cytokinesis ✓ is completed. 23
 - Each cell has a haploid set of chromosomes ✓/23 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 ✓/increases
 - this maintains pregnancy ✓/ maintains the thickness of the
 endometrium
 - and will inhibit the pituitary gland resulting in less FSH ✓.
 - Follicles will not be stimulated to develop. ✓
 - Menstruation/ovulation 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/5 trials 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 than girls. (1)
- 3.5.5 Increases validity ✓✓ (2)
 (8)
 [50]

TOTAL SECTION B: 100
 TOTAL: 148

LIFE SCIENCES
GR.12 JUNE EXAM 2023

ADDITIONAL NOTES ON THE MARKING OF THE PAPER

- 1.1 Do NOT accept if more than one option is provided e.g. 1.1.1 C/D X
- 1.3 Accept just the letter A if only is omitted.
- 1.5.1 b) Ignore the learners' response, these 2 marks have been removed from the paper.
- 1.5.4 If the learner gave only two letters then 3 marks or zero e.g. BA✓✓✓ AB X
If three or more letters are given then mark the first 3, one mark for each one in the correct position e.g. B✓ A X CX B
- 1.6.3. Be sensitive to alternative correct calculations
- 2.1.6 A learner may get one mark for a correct cause that doesn't have an effect, but they CAN NOT get a mark for an effect without a correct cause.
- 2.4.1 The word **iris** is needed for the marks to be awarded for the third and fourth bullets on the radial and circular muscles.
- 2.5.4 NO mark for Freckles and blue if the word 'eyes' is omitted.
- 3.5.2 Reference MUST be made to the specific numbers given in the text

Please note, the paper is out of 148 not 150. Change the raw mark on SASAMS from 150 to 148