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KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

**LIFE SCIENCES
EXAMINATION
MARKING GUIDELINES**

MARKS: 150

This Marking Guidelines consists of 8 pages.

PRINCIPLES RELATED TO MARKING LIFE SCIENCES

1. **If more information than marks allocated is given**
Stop marking when maximum marks is 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 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 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 the answer if correct.
10. **Wrong numbering**
If answer fits into the correct sequence of questions, but the wrong number is given, it is acceptable.
11. **If 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. 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.

SECTION A**QUESTION 1**

- | | | | | |
|-----|--------|--|----------|-------------|
| 1.1 | 1.1.1 | B✓✓ | | |
| | 1.1.2 | B✓✓ | | |
| | 1.1.3 | C✓✓ | | |
| | 1.1.4 | D✓✓ | | |
| | 1.1.5 | C✓✓ | | |
| | 1.1.6 | B✓✓ | | |
| | 1.1.7 | C✓✓ | | |
| | 1.1.8 | D✓✓ | | |
| | 1.1.9 | B✓✓ | | |
| | 1.1.10 | C✓✓ | (10 x 2) | (20) |
| 1.2 | 1.2.1 | Hypothalamus✓ | | |
| | 1.2.2 | Prolactin✓ | | |
| | 1.2.3 | Chorion✓ | | |
| | 1.2.4 | Progesterone✓ | | |
| | 1.2.5 | Allantois✓ | | |
| | 1.2.6 | Haemophilia✓ | | |
| | 1.2.7 | Allele✓ | | |
| | 1.2.8 | Genome✓ | | |
| | 1.2.9 | Sympathetic✓ | | |
| | 2.1.10 | Multiple Sclerosis✓ | (10 x 2) | (10) |
| 1.3 | 1.3.1 | B only✓✓ | | (2) |
| | 1.3.2 | None✓✓ | | (2) |
| | 1.3.3 | Both A and B✓✓ | | (2) |
| | | | | (6) |
| 1.4 | 1.4.1 | Dihybrid✓ cross | | |
| | 1.4.2 | (a) 3✓ | | (1) |
| | | (b) 1✓ | | (1) |
| | 1.4.3 | Triangular wings with white eyes✓ | | (1) |
| | 1.4.4 | 9 Triangular wings-red eyes: 3 Triangular wings-white eyes: 3 Oval wings-red eyes: 1 Oval wings-white eyes. ✓✓ | | (2) |
| | 1.4.5 | tR✓ / Rt | | (1) |
| | | | | (7) |

- 1.5 1.5.1 (a) Sensory✓ neuron (1)
- (b) Synapse✓ (1)
- 1.5.2 C✓ - Effector muscle✓ (2)
- 1.5.3 Transmits impulses from the sensory to the motor neurons/
connects a sensory neuron to a motor neuron✓ (1)
(Mark the FIRST one only)
- 1.5.4 There will be no reaction to the stimulus✓ (1)
(Mark FIRST one only)
- 1.5.5 - transmits impulses from receptors to the brain and from the brain to
the effectors✓
- contains reflex centres that function automatically to protect the
body✓ (1)
(Mark the FIRST one only) (7)
[50]

SECTION B**QUESTION 2**

- 2.1 2.1.1 (a) Translation✓ (1)
- (b) tRNA✓ (1)
- (c) Codon✓ (1)
- 2.1.2 GAG✓✓ (2)
- 2.1.3 - molecule S brings the required/specific amino acid✓
- to the ribosome✓ (2)
- 2.1.4 - the mRNA codon AUA will change into CUA✓
- and codon GCC will change into UCC✓.
- which will change anticodons UAU to GAU✓
- and anticodon CGG into AGG✓.
- Amino acid leucine will be replaced by glutamine✓
- and proline will be replaced by serine✓
- Resulting in a different protein being formed✓. Any (5)
(12)

2.2 2.2.1 (a) Spindle fibre✓ (1)

(b) Prophase I✓ (1)

2.2.2 (a) Forms spindle fibres✓ (1)

(b) Joins two chromatids/daughter chromosomes together✓ (1)

✓^T

2.2.3	Anaphase (Meiosis) I	Anaphase (Meiosis) II	
	No centromere splits✓	Centromere splits✓	
	Chromosomes move to opposite poles✓	Chromatids/daughter chromosomes move apart✓	
	A homologous pair of chromosomes move to one pole as abnormal process D ✓	A whole chromosome would move to one pole as abnormal process D ✓	(5)
	(Mark the FIRST TWO only)		1 mark for table + any (2 × 2)

- 2.2.4 - One gamete will have extra chromosome 21✓/24 chromosomes
 - and when it fertilises a normal gamete✓/gamete with 23 chromosomes
 - The zygote will have 3 copies of chromosome 21✓/47 chromosomes
 - Resulting in Down syndrome✓

Any (4)
(13)

2.3 2.3.1 13✓ (1)

2.3.2 Follicle (diameter) was the largest✓/ Follicle (diameter) decreases after day 13 (1)
(mark the FIRST one only)

2.3.3 LH✓ (1)

2.3.4 Oestrogen✓ (1)

2.3.5 It thickens the endometrium✓ (1)

2.3.6 No✓ (1)

- 2.3.7 - Corpus luteum disintegrated✓/follicle size decreases towards day 28
 - Causing progesterone levels to drop✓
 - And endometrium will break down✓ (3)
(9)

- 2.4 - Zygote is formed✓
 - Which undergoes mitosis✓ multiple times
 - Forming a mass ball of cells✓
 - Called a morula✓
 - Which further undergoes mitosis to form a hollow ball of cells✓
 - Called a blastocyst✓

Any **(4)**

- 2.5 Spermatogenesis✓*
- Under the influence of testosterone✓
 - diploid cells in the seminiferous tubules✓ / testis
 - undergo meiosis✓
 - to form haploid sperm cells✓ **(1 compulsory mark + any 3) (4)**
- 2.6 2.6.1 - Gland that secretes hormones into the blood stream✓✓
- OR**
- Ductless gland that secretes hormones✓✓ **(2)**
- 2.6.2 - Water level in the blood increases✓
- Hypothalamus is stimulated✓ / detects this increase
 - A message is sent to the pituitary gland✓
 - And less ADH is secreted✓ into the blood
 - Permeability of the nephron/distal convoluted tubule decreases✓
 - Less water is reabsorbed into the blood✓
 - More water is excreted as urine✓ / dilute urine is produced
 - Water level in the blood drops back to normal✓ **Any (6)**
- (8)**
[50]

QUESTION 3

- 3.1 3.1.1 Sclera✓ **(1)**
- 3.1.2 Cataracts✓ **(1)**
- 3.1.3 Surgery✓ **(1)**
- (mark the FIRST one only)**
- 3.1.4 Diagram 3✓ **(1)**
- 3.1.5 - The pupil is constricted✓*/narrower
- due to radial muscles relaxing✓
 - and circular muscles contracting✓
 - to cause less light to enter✓ **1 compulsory mark + any 2 (3)**
- 3.1.6 (a) Part B/ Ciliary muscles contract✓✓ **(2)**
- (b) Part C/ The lens becomes more convex✓✓ **(2)**
- (11)**
- 3.2 - A change in direction and speed✓ of the body
- causes the movement of fluid in the semi-circular canals✓
 - which stimulates the cristae✓
 - A change in the position of the head✓
 - stimulates the maculae✓ in the utricle and saccule
 - The stimulus is converted into an impulse✓
 - which were transported along the auditory nerve✓
 - and interpreted in the cerebellum✓
 - which sends impulses into the skeletal muscles✓
 - to restore balance✓
- Any (6)**

- 3.3 3.3.1 Aldosterone✓
(Mark the FIRST one only) (1)
- 3.3.2 - Enlarged penis✓
- Poor weight gain/weight loss✓
- Dehydration✓ (3)
(Mark the FIRST THREE only)
- 3.3.3 (a) - High androgens✓
- promote rapid growth✓ Any (2)
- (b) - Low amount of adrenalin✓* leads to
- Less/No conversion of glycogen into glucose✓
- Less/No increase in breathing rate and heart rate✓
- Less oxygen goes to skeletal muscles✓
- And less blood flows to the brain and skeletal muscles✓
- Low levels of cellular respiration✓
- Resulting in the lack of energy✓ causing weakness and tiredness. (1 compulsory + Any 5) (6)
(12)
- 3.4 3.4.1 (a) Unaffected✓ male (1)
(b) Gg✓ and GG✓ (2)
- 3.4.2 - Skomota is unaffected✓/does not have galactosemia
- and has Zandile/Sonwabile who are affected✓
with galactosemia /gg
- therefore must have inherited a recessive allele (g) from each parent ✓ (3)
- 3.4.3 P₁ Phenotype - Affected (male) × unaffected✓ (woman)
Genotype gg × Gg✓
Meiosis
G/Gametes g, g × G, g ✓
Fertilisation
F₁ Genotype Gg Gg gg gg ✓
Phenotype Unaffected affected✓
- P₁ and F₁ ✓
Meiosis and fertilisation✓
Therefore, there is a 50%✓* chance of a child with galactosemia.
(1 compulsory + Any 5)

OR

P_1 Affected male \times unaffected woman✓
 Phenotype gg \times Gg ✓
 Genotype
 Meiosis

Fertilisation

F_1

Phenotype

		Unaffected	
Affected	Gametes	G	g
	g	Gg Unaffected	gg Affected
	g	Gg Unaffected	gg Affected

✓ (correct gametes)
✓ (correct genotype)

2 Affected and 2 unaffected✓

P_1 and F_1 ✓
 Meiosis and
 fertilisation✓

Therefore, there is a 50%✓* chance of a child with galactosemia.

Any 5+1* (6)
(12)

- 3.5 3.5.1 Growth of GM salmon✓ (1)
- 3.5.2 - Serves as a control✓
- to verify that the growth of GM salmon is due to the environment in which it grows✓ (2)
- 3.5.3 - Same age of salmon/five day old salmon in each group✓
- Same species of salmon✓
- The measurement was done every month for 12 months✓ (1)
(mark FIRST one only)
- 3.5.4 $[(120 - 95) \div 95] \checkmark$ OR $(25/95) \checkmark \times 100 \checkmark$
 $= 0,26 \times 100 \checkmark$
 $= 26\% \checkmark$ (3)
- 3.5.5 GM salmon grows the best/the largest in the hatchery than in the simulated natural environment✓✓. (2)
(9)
[50]

TOTAL SECTION B: [100]

GRAND TOTAL: [150]