Province of the
EASTERN CAPE
EDUCATION

Iphondo leMpuma Kapa: Isebe leMfundo
Provinsie van die Oos Kaap: Department van Onderwys
Porafensie Ya Kapa Botjahabela: Lefapha la Thuto

NATIONAL SENIOR CERTIFICATE

GRADE 12

JUNE 2026

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LIFE SCIENCES
AMENDED MARKING GUIDELINE

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MARKS: 150

TIME : 2,5 hrs

This marking guideline consists of 10 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.

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15. **If units are not given in measurements**
Candidates will lose marks. Marking guideline 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 and concepts)**
A single word or two that appear(s) 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.



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SECTION A

QUESTION 1

1.1	1.1.1	A✓✓		
	1.1.2	B ✓✓		
	1.1.3	A/**B**✓✓		
	1.1.4	A✓✓		
	1.1.5	C✓✓		
	1.1.6	B ✓✓		
	1.1.7	B ✓✓		
	1.1.8	B✓✓		
	1.1.9	A✓✓		
	1.10	D✓✓	(10 x 2)	**(20)**
1.2	1.2.1	Corpus luteum ✓		
	1.2.2	Oestrogen ✓		
	1.2.3	Oval window ✓ **fenestra ovalis**		
	1.2.4	Macula✓		
	1.2.5	Alzheimer✓		
	1.2.6	Testosterone✓/**FSH**		
	1.2.7	Ciliary muscle✓		
	1.2.8	Fallopian tube✓		
	1.2.9	Negative feedback✓		
	1.2.10	Seminiferous tubules✓	(10 x 1)	**(10)**
1.3	1.3.1	None✓✓		
	1.3.2	A only✓✓		
	1.3.3	A only✓✓	(3 x 2)	**(6)**
1.4	1.4.1	Presence /absence of freckles✓ and shape of the hairline✓		(2)
	1.4.2	HF,Hf,hF,Hf✓✓/ **HF,Hf,hF,hf**		(2)
	1.4.3	Meiosis✓		(1)
	1.4.4	Fertilisation✓		(1)
	1.4.5	25%✓/**18.75% / 19%**		(1)
				(7)
1.5	1.5.1	a) A✓ sensory neuron✓		(2)
		b) C✓ spinal nerve ✓/ **Motor neuron**		
		OR		
		A ✓sensory neuron✓		(2)
	1.5.2	Extensor muscle✓ and flexor muscle ✓		(1)
	1.5.3	Two✓		(2)
				(11)
			TOTAL SECTION A:	**50**

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QUESTION 2

2.1 2.1.1 45✓ (1)

2.1.2 Homologous chromosomes are shown✓/ chromosomes are in pairs / **diploid number/ Full set of chromosomes/ has both paternal and maternal sets of chromosomes** (1)

2.1.3 Non disjunction✓ (1)

2.1.4 Anaphase I✓/II (1)

2.1.5 - The gamete has 24 chromosomes✓.
- At position 13 there are two chromosomes instead of one✓ (2)

2.1.6 - **In Patau syndrome there are 3 chromosomes in pair 13✓ instead of two ✓**
- **In down Syndrome there are 3 chromosomes in pair 21✓ instead of two✓** (4)

(10)

2.2 2.2.1 (a) Suspect 2✓ (1)

(b) - All the DNA bars of suspect 2 match the DNA bands of the sample from the nails✓/ DNA bands of suspect 2 are a 100%/exact match to those found in the nail sample.
- **All 13 DNA bands of suspect 2 match those of the sample from the nails✓** Any 1 (1)

2.2.2 - All the DNA bars of the victim do not match with those found on the nail sample ✓
- showing that the sample belongs to another person as the DNA of all individuals are unique✓

OR

- If the victim had scratched herself, only her own DNA would be present under her nails. ✓
- The DNA found under the nails does not match the victim's DNA but matches that of Suspect 2. ✓ (2)

2.2.3 - **DNA samples could be planted on crime scene✓ resulting in conviction of innocent people✓**
- **Human error when analysing the DNA profile✓ could lead to wrong arrests✓**

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- **Twins share identical DNA✓,**
  a wrong twin can be arrested for what he/she did not do✓
- **A short segment of DNA is used✓**
  therefore, results may not be reliable✓
- **Swopping samples in lab✓**
  could lead to false accusation✓
- **DNA profile cannot determine the time when the DNA tissue was left on the victim's nails ✓**
  therefore, it cannot determine the time of contact ✓

(Mark first TWO only) (Any 1 X 2) (2)

2.2.4 - High level of accuracy ✓as every persons DNA is unique✓

- **DNA is unique to individuals who are not identical twins✓ and is accurately used to identify suspects✓can be used to save innocent accused individuals**
- **Criminals whose DNA profiles are in the police database✓ are quickly caught when they commit crimes✓**

(Any 1 X 2) (2)

(8)

2.3
- Both occur in the nucleus✓/ nucleoplasm
- Both involve unwinding (unzipping) of the DNA double helix✓
- Both involve unzipping of DNA double helix/ breaking of hydrogen bonds
- Both involve separation of the two DNA stands✓
- **Both use DNA template✓**
- **Both use free nucleotides from the nucleoplasm✓**
- **Both process are controlled by enzymes✓**
- **Both involve complementary bases✓**

(Any 4) **(4)**

2.4 2.4.1 (a) Peptide bond ✓ (1)

(b) Amino Acid✓/ asparagine (1)

2.4.2 UUA✓ (1)

2.4.3
- **Codon is UCA instead of UGA✓**
- **Anticodon is AGU instead of ACU ✓**
- **amino acid would be serine✓ instead of threonine✓**
- Sequence of amino acids will change✓

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- A different protein will be formed✓ (Any 4) (4)

(7)

2.5 2.5.1 (a) D✓-Follicle stimulating hormone ✓ (FSH) (2)

(b) A✓- Luteinising hormone✓ (LH) (2)

2.5.2 Day 14 ✓/13 (1)

2.5.3 - LH/ Luteinizing hormone is at its peak✓,

- stimulating the Graafian follicle to burst✓ (2)

2.5.4 - **Corpus luteum continues secreting progesterone✓/hormone B**

- **This results in high level of progesterone in the blood ✓**
- **This inhibits the secretion of FSH✓**
- **by the pituitary gland✓**
- **As a result, no follicle develops✓**
- **and no oestrogen is secreted✓**

(Any 4) (4)

(11)

2.6 2.6.1 (a) Mitosis✓ (1)

(b) Meiosis✓ (1)

(c) oogenesis✓ (1)

(d) fertilisation✓ (1)

2.6.2 Ovary✓ (1)

2.6.3 - Zygote divides by mitosis ✓

- **to form a solid ball of cells ✓**
- called the morula✓
- The morula divides by mitosis **to form a hollow ball of cells ✓**
- called the blastula✓
- The chorion forms the finger like projections the chorionic villi✓
- These chorionic villi and the endometrium form the placenta✓

(Any 5) (5)

(10)

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QUESTION 3

3.1 3.1.1 - Reflex action is a rapid involuntary response to a stimulus✓
- Reflex arc is the pathway followed by an impulse from the receptor to the effector✓ (2)

3.1.2 (a) slows impulse ✓transmission (1)

(b) Loss of memory/learning difficulties/vision and hearing loss✓ (1)

3.1.3 - Autonomic nerves✓

- Somatic nerves✓(Remove this is not in the examination guidelines) (2)

3.1.4 A damaged myelin sheath leads to:

- slower /blocked impulse transmission✓
- from the cerebellum✓
- to the skeletal muscles✓.
- Skeletal muscle contraction and relaxation will be disrupted leading
- to impaired movement✓
- **resulting in loss of balance/equilibrium** ✓

(Any 3) (3)

(9)

CONVERSION TABLE (CT) For Question 3.1.3	
Learner mark out of 8	Add
1-5	0
6-8	1

3.2 3.2.1 To trace an inheritance of a genetic disorder/ characteristic over generations✓ /families

OR

to trace how traits are passed down through generations/ families (1)

3.2.2 Inheritance caused by an allele carried on the X chromosomes✓/sex-chromosomes / **gonosomes** (1)

3.2.3 - Individual 14 is a female without XLA✓

- Her genotype is X^BX^b✓/She has a dominant allele that masks the recessive allele X^b / If XLA were caused by a dominant allele, she would show the condition.

OR

XLA cannot be caused by a dominant allele because unaffected parents (e.g. 1 and 2) have an affected child (5)✓. If the allele were dominant, mother (2) would have shown the condition.✓

OR

Similarly, individuals 7 and 8 do not have XLA, but they have an affected son, 13. ✓ If the allele were dominant, mother (7) would have shown the condition.✓

OR

Individuals 9 and 10 do not have XLA, but they have an affected son, 15. ✓ If the allele were dominant, mother (10) would have shown the condition.✓

OR

XLA is not caused by a dominant allele because affected male 5 has an unaffected daughter✓ (12). If the allele were X-linked dominant, all daughters of an affected father would inherit the dominant allele and be affected. ✓ (2)

(Any 1 x 2)

3.2.4 (a) 9,11✓ (1)

(b) 4,6,8✓✓ (2)

3.2.5 P1: phenotype Male with XLA X Female without XLA✓

Genotype: X^bY X X^BX^b ✓

Meiosis:

Gametes: X^b Y X X^B X^b ✓

Fertilisation:

F1 genotype: X^BX^b X^bX^b X^BY X^bY ✓

Phenotype 1 female without XLA; 1 female with XLA;

1 male without XLA; 1 male with XLA ✓

50% ✓* chance of a child with XLA

OR

P1: phenotype Male with XLA X Female without XLA✓

Genotype: X^bY X X^BX^b

Meiosis:

Gametes	X^B	X^b
X^b	$X^B X^b$	$X^b X^b$
Y	$X^B Y$	$X^b Y$

Fertilisation ✓

F1 genotype: X^BX^b X^bX^b X^BY X^bY ✓

Phenotype 1 female without XLA; 1 female with XLA;
1 male without XLA; 1 male with XLA ✓
50% ✓* chance of a child with XLA

P1 & F1✓

Meiosis & fertilisation✓ ***1 compulsory mark** + any 5 (6)

We acknowledge that question 3.2.5 may be viewed as having overstepped an ethical boundary. **While this is an ethical concern, it does not affect the correctness of the expected responses and therefore does NOT require any amendment to the Marking Guideline**. We apologise for this oversight and will take greater care to ensure that future assessments are appropriately framed.

3.2.6
- **XLA syndrome is caused by a recessive allele✓**
- **found in X chromosome✓**
- **Females have only two X chromosomes✓**
- **If they inherit one recessive allele, they will not have XLA syndrome ✓**
- **since it will be masked by the dominant allele✓/ for them to be affected they must inherit two recessive alleles**
- **Males have only one X chromosomes✓**
- **and if they inherit one recessive allele, they have the XLA syndrome✓**

(Any 4) (4)

(17)

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3.3 3.3.1 A process where biological processes are manipulated to satisfy human needs✓ (1)

3.3.2

Cloning	Genetic engineering
Involves insertion of all the genetic material of donor organism✓	Only the gene for desirable characteristic is inserted✓
Genetic material is inserted in the ovum✓	Genetic material is inserted into the DNA molecule✓/ chromosomes
- results in production of genetically identical organisms✓	- results in genetically modified Organisms/GMOs✓
- Leads to no variation ✓	- leads to variation amongst organisms✓
- No new trait✓	- A new trait✓/phenotype is produced
- Same species used✓	- Same or different species used✓

(Any 2 X 2) (4)

3.3.3 - An antifreeze gene from the ocean pout fish✓
- and a growth hormone gene from the chinook salmon✓
- are inserted into the nucleus✓
- of fertilised eggs of salmon fish✓
- The eggs then develop into a genetically engineered Atlantic salmon✓
- that grows very fast and grows all year round✓

OR

- **An enzyme✓ is used to cut gene for all year round growth from ocean pout fish✓**
- **Same enzyme is used to cut gene for faster growth from Pacific Chinook Salmon✓**
- **Both genes are transferred to the DNA of an Atlantic salmon✓embryos**
- **Because of recombinant DNA✓, the salmons grow all year faster✓** (6)

(11)

3.4 3.4.1 (a) retinal implant✓/(presence or absence of) implanted device (1)

(b) vision✓ (1)

3.4.2 - To ensure that participants voluntarily agreed to take part in the study✓

- To confirm that participants were fully informed about the procedure, risks and benefits ✓
- To provide a legal record for the participant and research team/protests researchers from legal obligations ✓/**Investigators have to protect themselves from people who might sue for damages✓/ avoid accountability for damage**

(Any 2) (2)

3.4.3 $\frac{84}{100}$ ✓X 32✓ =27✓participants (3)

3.4.4 - To provide the baseline✓ (original) reading ability of the participants.

- to allow a fair comparison between vision before and after the retinal implant✓

OR

- **To get initial vision ✓/ baseline**
- **so that it is established whether the implants helped to restore vision of people with AMD or not ✓** (2)

3.4.5 - Photoreceptors (cones) in the yellow spot are stimulated✓

- light stimulus changed/converted into an impulse✓
- Impulses is transmitted by the optic nerve✓
- To the cerebrum✓ for the interpretation of the image✓ Any (4)

(13)

[50]

TOTAL SECTION B: 100

GRAND TOTAL: 150

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