Province of the
EASTERN CAPE
EDUCATION

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

NATIONAL SENIOR CERTIFICATE

GRADE 12

JUNE 2026

LIFE SCIENCES MARKING GUIDELINE

MARKS: 150

This marking guideline consists of 9 pages.

PRINCIPLES RELATING TO MARKING LIFE SCIENCES

1. **If more information is given than the marking**
   Stop marking after the maximum points have been obtained and draw a squiggly line, indicating 'max' points in the right-hand margin.

2. **If, for example, three reasons are required and five are given**
   Just tick the first three regardless of whether all or some are correct/not correct.

3. **If the entire process is described while only a part is required**
   Read everything and credit the relevant part.

4. **If equations are required, but descriptions are given**
   Accept if the differences/similarities are clear.

5. **If tabulation is required, but paragraphs are given**
   Candidates will forfeit points if not tabulated.

6. **If annotated diagrams are presented, while descriptions are required**
   Candidates will forfeit points.

7. **If flowcharts are presented instead of descriptions**
   Candidates will forfeit points.

8. **If the order is vague and links don't make sense**
   Credit where order and linkages are correct. Where order and linkages are not correct, do not credit. If the order and linkages are correct again, continue to credit.

9. **Unrecognizable abbreviations**
   Accept if defined in the answer at the beginning. If it is not defined, do not credit the unrecognizable abbreviation, but credit the rest of the answer if it is correct.

10. **Misnumbered**
    If the answer fits the correct order of the questions, but the wrong number is given, this is acceptable.

11. **If language used changes the intended meaning**
    Don't assume.

12. **Spelling mistakes**
    Accept if it is recognisable, 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**
    Accepted, provided it was adopted at the national standardization meeting.

14. **If only the letter is required, but only the name is given (and vice versa)**
    Don't credit

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15. **If units are not indicated in measurements**
Candidates will forfeit points. Marking guidelines will indicate points for units separately.

16. **Be sensitive to the meaning of the answer, which can sometimes be presented in different ways.**

17. **Header**
All illustrations (diagrams, graphs, tables, etc.) must have a heading.

18. **Mixing of official languages (terms and concepts)**
A single word or two that appears in any official language other than the learner's assessment language in which most of his/her answers are presented should be credited, if correct. A marker proficient in the relevant official language should be consulted. This applies 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 ✓✓		
	1.1.4	A ✓✓		
	1.1.5	C ✓✓		
	1.1.6	B ✓✓		
	1.1.7	B ✓✓		
	1.1.8	B ✓✓		
	1.1.9	A ✓✓		
	1.1.10	D ✓✓	(10 x 2)	(20)
1.2	1.2.1	Corpus luteum ✓		
	1.2.2	Estrogen ✓		
	1.2.3	Oval window ✓		
	1.2.4	Macular ✓		
	1.2.5	Alzheimer's ✓		
	1.2.6	Testosterone ✓		
	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 ✓✓		(2)
	1.4.3	Meiosis ✓/ Reduction division		(1)
	1.4.4	Fertilization ✓		(1)
	1.4.5	25% ✓ / $\frac{4}{16} \times 100$ = 25% ✓		(1)
1.5	1.5.1	a) A ✓ sensory neuron ✓		(2)
		b) C ✓ spinal nerve ✓		(2)
	1.5.2	Extensor muscle ✓ and flexor muscle ✓		(1)
	1.5.3	Two ✓		(2)

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 (1)

2.1.3 Non disjunction ✓ (1)

2.1.4 Anaphase I ✓/II (1)

2.1.5 The gamete has 24 chromosomes. ✓ The abnormal gamete contains two copies of chromosome 13 instead of one ✓ (2)

2.1.6
- Down syndrome is caused by non-separation of chromosomes at position 21 ✓
- resulting in a gamete with two chromosomes at position 21 ✓
- which when fertilized by a normal gamete ✓
- results in a zygote with three chromosomes at position 21 ✓ (4)

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. (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
- Evidence could have been planted at the crime scene ✓
- Human error might have occurred during the procedure ✓
- Manipulation of results can occur ✓
- Contamination of the DNA sample ✓
- Suspect may have an identical twin ✓

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

2.2.4 High level of accuracy ✓ as every persons DNA is unique ✓ (2)

2.3
- Both occur in the nucleus ✓
- Both involve unwinding (unzipping) of the DNA double helix ✓
- Both involve breaking of the hydrogen bonds ✓
- Both involve separation of the two DNA stands ✓ (4)

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2.4 2.4.1 (a) Peptide bond ✓ (1)

(b) Amino Acid ✓ (1)

2.4.2 UUA ✓ (1)

2.4.3
- tRNA with anticodon AGU will bring serine ✓ instead
- tRNA with anticodon ACU bringing threonine ✓
- Sequence of amino acids will change ✓
- A different protein will be formed ✓ (4)

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

(b) A ✓- Luteinising hormone ✓ (LH) (2)

2.5.2 Day 14 ✓ (1)

2.5.3
- Luteinizing hormone is at its peak, ✓
- stimulating the Graafian follicle to burst ✓ (2)

2.5.4
- Progesterone levels in the blood increases ✓
- Inhibiting pituitary gland ✓
- Less FSH secreted by pituitary gland ✓
- No further development of the follicles ✓
- No ovulation ✓ (Any 4 x 1) (4)

2.6 2.6.1 (a) Mitosis ✓ (1)
(b) Meiosis ✓ (1)
(c) Oogenesis ✓ (1)
(d) Fertilization ✓ (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 outer membrane of the blastula, the chorion ✓
- forms finger like projections the chorionic villi ✓
- These chorionic villi embed into the thick, vascular endometrium to form the placenta ✓ (Any 5 x 1) (5)

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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) Disrupts impulse transmission leading to a slower or blocked nerve communication ✓ (1)

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

3.1.3
- Somatic nerves ✓
- Autonomic nerves ✓ (2)

3.1.4
- A damaged myelin sheath leads to slower /blocked impulse transmission by the motor neurons ✓
- from the cerebellum ✓
- to the skeletal muscles. ✓
- Skeletal muscle contraction and relaxation will be disrupted leading to impaired movement ✓ (Any 3 x 1) (3)

3.2 3.2.1 To trace an inheritance of a genetic disorder/characteristic over generations ✓ /to trace how traits are passed down through generations (1)

3.2.2 Inheritance caused by an allele carried on the X chromosomes ✓ /sex-chromosomes (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. (2)

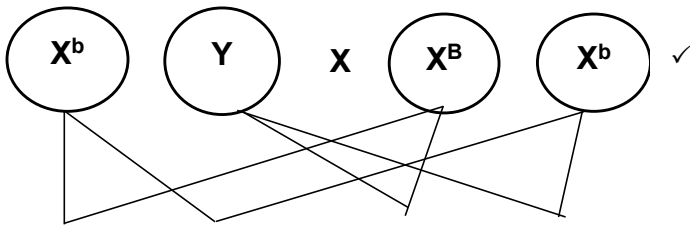
3.2.4 (a) 9, 11 ✓ (1)

(b) 4, 6, 8 ✓✓ (2)

3.2.5 P_1: phenotype Male with XLA X Female without XLA ✓
Genotype: $\mathbf{X^bY}$ X $\mathbf{X^BX^b}$
Meiosis:

Gametes: $\mathbf{X^b}$ $\mathbf{Y}$ **X** $\mathbf{X^B}$ $\mathbf{X^b}$ ✓

Fertilization:



F_1 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

P_1: 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

Fertilization ✓

F1 genotype: X^BX^b X^bX 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

P_1 and F_1 ✓
Meiosis and fertilization ✓

***1 compulsory mark** + (Any 5 x 1) (6)

3.2.6
- Girls have two X chromosomes. ✓
- To suffer from XLA they need to have two recessive alleles on both X chromosomes ✓ / homozygous dominant X^bX^b).
- If they are heterozygous (X^BX^b) the dominant allele will mask the recessive alleles for XLA ✓
- Whilst males only need to have a recessive on one X chromosome to suffer from XLA ✓ (4)

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

3.3.2
- Cloning involves insertion of all the genetic material from the donor organisms with desirable characteristics ✓
- Genetic material is inserted into an empty nucleus of the ovum ✓
- It produces an identical copy of the cloned organisms ✓ (Any 2 x 1) (2)

- Genetic engineering involves insertion of the gene responsible for the desirable characteristic. ✓
- The gene is inserted into the DNA of the organism to be genetically engineered. ✓
- It results in a genetically modified organisms ✓ (Any 2 x 1) (2)

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 ✓ (6)

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

(b) Restoration of vision ✓ in patients with AMD/ability to read and recognise objects (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 ✓ (Any 2 x 1) (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 ✓ (2)

3.4.5
- Photoreceptors (cones) in the yellow spot are stimulated ✓
- Cones change light stimulus into an impulse ✓
- Impulses is transmitted by the optic nerve ✓
- To the cerebrum ✓ for the interpretation of the image ✓ (Any 4 x 1) (4)

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TOTAL SECTION B: 100
GRAND TOTAL: 150

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