Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 12

JUNE 2023

LIFE SCIENCES MARKING GUIDELINE

MARKS: 150

This marking guideline consists of 11 pages.

PRINCIPLES RELATED TO MARKING LIFE SCIENCES

1. **If more information than marks allocated is given**
   Stop marking when maximum marks are 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 guidelines 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 learner's 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 B ✓✓
1.1.2 A ✓✓
1.1.3 A ✓✓
1.1.4 B ✓✓
1.1.5 A ✓✓
1.1.6 D ✓✓
1.1.7 C ✓✓
1.1.8 C ✓✓
1.1.9 C ✓✓
1.1.10 C ✓✓ (10 x 2) (20)

1.2
1.2.1 Incomplete ✓ dominance

1.2.2 Non-disjunction ✓

1.2.3 Karyotype ✓

1.2.4 Haemophilia ✓

1.2.5 Meninges ✓

1.2.6 Ovovivipary ✓

1.2.7 Parental care ✓ (7 x 1) (7)

1.3
1.3.1 Both A and B ✓✓

1.3.2 A only ✓✓

1.3.3 None ✓✓ (3 x 2) (6)

1.4
1.4.1 Dihybrid cross ✓ (1)

1.4.2 (a) bbnn ✓✓ (2)
(b) Bitter ✓ (1)
(c) BN Bn bN bn ✓✓ (2)

1.4.3 bbNn is sweet with yellow spots ✓
Bbnn is bitter with no yellow spots ✓ (2)

1.4.4 The various 'factors' controlling the different characteristics are separate entities, not influencing each other in any way, and sorting themselves out independently during gamete formation. ✓✓ (2)

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1.5 1.5.1 Cloning ✓ (1)

1.5.2
- Better quality fruits/vegetables/meat/increased shelf-life/better nutritional value ✓
- Better yield/higher quantity of products
- More money for the farmer/community ✓

(MARK FIRST TWO ONLY) (2)

1.5.3 (a) Mitosis ✓ (1)

(b) Meiosis ✓ (1)

1.5.4 (a) 38 ✓ (1)

(b) 38 ✓ (1)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 2.1.1 Chromosomes ✓/chromatids/genes/allele (1)

2.1.2
- Mitochondria ✓
- Chloroplasts ✓

(Mark first ONE only) (1)

2.1.3 (Nitrogenous) bases ✓ (1)

2.1.4
- Transcription✓*
- The double helix DNA unwinds ✓
- The double-stranded DNA unzips ✓/weak hydrogen bonds break
- to form two separate strands ✓
- One strand is used as a template ✓
- to form mRNA ✓
- using free RNA nucleotides from the nucleoplasm ✓
- The mRNA is complementary to the DNA ✓/A complements U, G complements C
- mRNA now has the coded message for protein synthesis ✓

1 compulsory mark + Any 5 (6)

2.2 2.2.1 (a) 4 ✓/ Four (1)

(b) 3 ✓/Three (1)

2.2.2 CTC ✓ (1)

2.2.3
- The DNA triplet CAG changed to TAG ✓/ C changed
- The codon GUC changed to AUC ✓
- The anticodon sequence changed ✓/ CAG to UAG
- The amino acid valine was replaced by isoleucine ✓
- This results in a different protein ✓/ enzyme
- The active site of the enzyme changes ✓*/shape of enzyme changes
- Therefore, the enzyme no longer fits the substrate/ carbohydrate ✓*

* **2 compulsory marks** + Any 3 (5)

2.3 2.3.1 Crossing over ✓ (1)

2.3.2 Homologous chromosomes ✓ (1)

2.3.3
- Attaches the chromosome to the spindle fiber ✓
- Joins the two halves of a double-stranded chromosome (Any 1) (1)

2.3.4 - Chromosomes pair ✓ up/homologous pairs form
- exchange of genetic material occurs ✓
- between chromatids ✓ /adjacent chromosome pairs
- at points called chiasmata ✓/chiasma (Any 3 x 1) (3)

2.3.5 - It brings about variation ✓ which may
- improve chances of survival ✓ of organisms (2)

2.4 2.4.1 Progesterone ✓ (1)

2.4.2 - The blood concentration of hormone Y increased after day 14 ✓ / ovulation
- maintaining the thickness of the uterus lining ✓/endometrium (2)

2.4.3 Endometrium ✓ (1)

2.4.4 - The level of hormone Y/progesterone decreased ✓
- resulting in a decrease in the thickness of the uterus lining ✓
- followed by menstruation ✓
- This indicates that fertilisation did not occur ✓ (Any 3 x 1) (3)

2.4.5 - FSH ✓ / Follicle Stimulating Hormone
- stimulates the development of the follicles into an ovum ✓
- LH ✓/ Luiteinising Hormone
- stimulates ovulation ✓ (4)

2.5 2.5.1 (a) An allele that is expressed (shown) in the phenotype when found in the heterozygous and homozygous condition ✓ (1)

(b) Two parents (Tom and Lee) both with Cadasil have a child (Abby/ Bob) without Cadasil ✓

OR

If recessive all of Tom and Lee's children would have Cadasil ✓ (1)

2.5.2 (a) Heterozygous ✓ (1)

(b) He has children without Cadasil ✓

OR

If he was homozygous all children would have Cadasil (1)

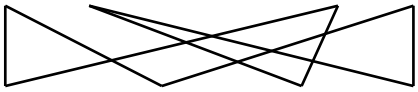
2.5.3

P_1	Phenotype	Male with Cadasil	x	Female without Cadasil ✓
	Genotype	Dd	x	dd ✓

Meiosis

G/gametes D, d x d, d ✓

Fertilisation



F_1 Genotype Dd, Dd, dd dd ✓

Phenotype 50% child with Cadasil, 50% child without Cadasil ✓*

P_1 and F_1 ✓

Meiosis and fertilisation ✓

***1 compulsory mark** + Any 5

OR

P_1	Phenotype	Male with Cadasil	x	Female without Cadasil ✓
	Genotype	Dd	x	dd ✓

Meiosis

Fertilisation

Gametes	D	d
d	Dd	dd
d	Dd	dd

1 mark for correct gametes
1 mark for correct genotypes

F_1 Phenotype 50% child with cadasil, 50% child without cadasil ✓*

P_1 and F_1 ✓

Meiosis and fertilisation ✓

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

2.6 2.6.1 - Stemcells are undifferentiated cells ✓
- That have the ability to grow and differentiate ✓
- into any tissue ✓ in the body (3)

2.6.2 It is less controversial ✓using skin cells than embryonic cells. (1)

[50]

QUESTION 3

3.1 3.1.1 Man A has:
- Many ✓ /enough/more sperms
- normally shaped ✓ /healthy sperms

OR

Man B has
- Fewer ✓/not enough/lesser sperms
- abnormally shaped ✓ /unhealthy sperms (2)

3.1.2
- Sperm has a neck area with large amount of mitochondria ✓ which will produce energy ✓ for the sperm to move to the Fallopian tube.
- Sperm has a tail ✓ which propel the sperm/make movements ✓ so the sperm could move to the Fallopian tube (2 x 2) (4)

3.1.3
- Females have XX (identical) type and males have XY (non-identical) chromosome and one Y chromosome ✓
- When the sperm with X chromosome fuses with the ovum, the child will have XX type of sex chromosomes (girl child) ✓
- If the sperm with a Y chromosome fuses with the ovum, the child will have an XY type of sex chromosome (boy child) ✓ (3)

3.1.4

Spermatogenesis	Oogenesis
Occurs in the testes/ seminiferous tubules ✓	Occurs in the ovary ✓
Influenced by testosterone ✓	Influenced by FSH
Occurs continuously ✓	Occurs once during every menstrual cycle ✓
Four sperm cells are produced✓	One ovum is produced ✓

(Mark first TWO only) Table 1 + (Any 2 x 2) (5)

3.2 3.2.1 Middle ear ✓ (1)

3.2.2 Ossicles ✓ (1)

3.2.3
- The bones will not move and vibrate ✓ in reaction to sound
- resulting in hearing loss ✓ (2)

3.2.4
- Eustachian tube ✓*
- When a person goes skydiving, the atmospheric pressure changes all the time ✓
- When descending, the Eustachian tube cannot equalise the pressure ✓ on both sides of the tympanic membrane/the pressure on both sides will not be the same.
- which may cause the tympanum to rupture ✓/damage

1* compulsory mark + 3 (4)

3.2.5 The surface area of the eardrum is larger than that of the oval window, ✓ thus a greater force is concentrated into a smaller area. ✓ (2)

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3.3 3.3.1 Reflex action ✓ (1)

3.3.2 As the bee approaches the man's eye,
- light from the bee reaches the light sensitive cells (receptors) in the eye ✓ /the receptors in the eyes are stimulated and converted stimulus into an impulse ✓
- the impulse travels via the sensory neuron ✓to the spinal cord
- In the spinal cord, the sensory neuron makes a synaptic contact ✓
- with the interneuron. ✓
- Which makes synaptic contact with motor neuron ✓ and
- transmits the impulse ✓
- to the muscles in the eyelid ✓/ effectors
- The muscles in the eyelid respond by contracting ✓
- shutting the man's eye before the bee hit his eye ✓
- This is known as reflex action. (Any 5 x 1) (5)

3.3.3 (a)
- cataract scatters and blocks the light ✓ as it passes through the lens,
- preventing a sharply defined image from reaching your retina ✓
- as a result, your vision becomes blurred ✓ (Any 2 x 1) (2)

(b) $\frac{17,2}{100}$ ✓ x 151,34 ✓ *million* = 26,03 *million* ✓ (3)

3.4 3.4.1 (a) effect of caffeine ✓ (1)

(b) (an individual's) reaction time ✓ (1)

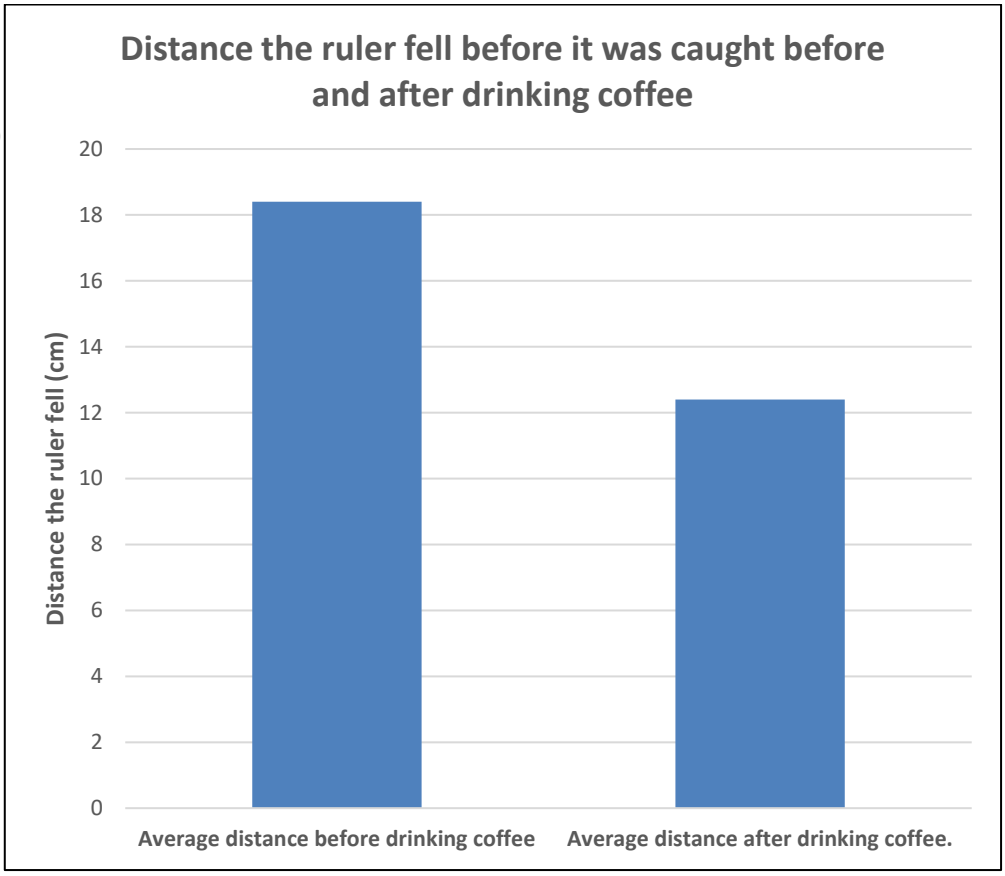
3.4.2 (8 + 13 + 11 + 17 + 10 + 14 + 13 + 13) = $\frac{99}{8}$ ✓ = 12,4 ✓ (2)

3.4.3
- The experiment was repeated seven more times ✓
- The average was used ✓ (1)

3.4.4
- Use a larger sample of individuals ✓ / perform investigation on several other people
- Use other (measures) amounts of coffee ✓
- Use different / more time intervals ✓

(Mark first TWO only) (2)

3.4.5



Criteria for marking the graph

Title of the graph (both variables) (T)	1
Bar graph is drawn (Type) (B)	1
Correct labels for X- and Y-axes + correct unit (L)	1
Appropriate scale for both axes (S)	1
Only the correct 3 areas have been represented (A)	1
Plotting of the graph (P)	1 bar drawn correctly: 1
	2 bars drawn correctly: 2

NOTE:
If the wrong type of graph is drawn, marks will be lost for:

- Correct type of graph ✓
- Plotting of the graph ✓

The axes can be transposed.
A bar graph can have horizontal bars. (6)

3.4.6 Caffeine slows down ✓/reduce an individual's reaction time. ✓ (2)
[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150

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