Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 12

JUNE 2024

LIFE SCIENCES MARKING GUIDELINE

MARKS: **150**

This marking guideline consists of 9 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 provincial marking guideline 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	C ✓✓		
	1.1.2	A ✓✓		
	1.1.3	D ✓✓		
	1.1.4	A ✓✓		
	1.1.5	D ✓✓		
	1.1.6	D ✓✓		
	1.1.7	C ✓✓		
	1.1.8	D ✓✓		
	1.1.9	B ✓✓		
	1.1.10	C ✓✓	(20 x 1)	(20)
1.2	1.2.1	Haemophilia ✓		
	1.2.2	Anaphase 1 ✓		
	1.2.3	Non-disjunction ✓		
	1.2.4	Chromosome ✓		
	1.2.5	Centriole ✓/centrosome		
	1.2.6	Multiple sclerosis ✓		
	1.2.7	Short-sightedness ✓/Myopia		
	1.2.8	Auditory nerve ✓		
	1.2.9	Oestrogen ✓		
	1.2.10	Amniotic ✓ fluid	(10 x 1)	(10)
1.3	1.3.1	A only ✓✓		
	1.3.2	B only ✓✓		
	1.3.3	B only ✓✓		(6)
	1.4.1	(a) E ✓		(1)
		(b) A ✓		(1)
		(c) C ✓		(1)
1.4	1.4.2	F ✓ motor neuron ✓/efferent neuron		(2)
	1.4.3	D to E ✓		(1)
1.5	1.5.1	(a) A ✓ ciliary muscle ✓		(2)
		(b) C ✓ iris ✓		(2)
		(c) D ✓ cornea ✓		(2)
	1.5.2	Accommodation ✓		(1)
	1.5.3	(Diagram) 2 ✓		(1)

TOTAL SECTION A: 50

QUESTION 2

2.1 2.1.1 (James) Watson ✓ (1)

2.1.2 double helix ✓ (1)

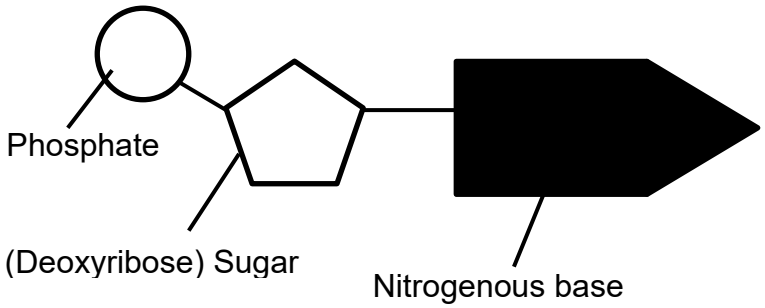
2.1.3 Sample 1 ✓ (1)

2.1.4
- In Sample 1 the number of A/adenine equals the number of T/thymine and G/guanine is equal to C/cytosine ✓✓/In a DNA molecule A/G and T/C are complementary pairs and are therefore equal.

OR

- There is no U/uracil in sample 1 ✓✓/DNA does not contain U/uracil. (2)

2.1.5



Marking guideline for drawing a nucleotide:

Criteria	Mark allocation
Phosphate diagram and labelled in correct position	1 mark
Sugar diagram and labelled in correct position	1 mark
Nitrogenous base diagram and labelled in correct position	1 mark

(3)

2.1.6

DNA	RNA
Has thymine base ✓	Has uracil base ✓
Deoxyribose sugar ✓	Ribose sugar ✓

Table ✓ + any ONE difference ✓✓ (3)

2.2.1 A-U-G-A-G-C-G-U-A ✓✓ (2)

2.2.2
- 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 floating RNA nucleotides ✓ in the nucleus
- which joins to their complimentary bases ✓ / A-U and C-G (Any 4 x 1) (4)

2.2.3 C was replaced with G in DNA …
- Therefore, the mRNA will change from G to C ✓
- The tRNA will change from C to G ✓
- This would code for a different amino acid ✓
- Which would code for the protein which breaks down DDT ✓ (4)

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2.3 2.3.1 FSH ✓ / oestrogen (1)

2.3.2
- FSH – follicle starts to develop ✓/grow

OR

- Oestrogen – endometrium starts to thicken ✓

(NB: Reason for hormone must correspond to hormone given in 2.3.1) (1)

2.3.3
- The corpus luteum does not degenerate ✓ after day 28
- and continues to produce progesterone ✓
- which maintains the endometrium after day 28 ✓/ endometrium does not degenerate (3)

2.3.4
- The zygote ✓
- divides by mitosis ✓
- to form a (solid) ball of cells ✓
- called a morula ✓
- which then develops into a hollow ball of cells ✓
- called the blastula ✓ / blastocyst (6)

2.3.5
- LH ✓ would be monitored.
- Ovulation takes place when LH peaks ✓ /reaches maximum.
- therefore, the ovum would be available for fertilisation ✓ (3)

2.4 2.4.1 Genetic engineering ✓/ Recombinant DNA (1)

2.4.2
- There will be no nuts as food for humans ✓/ no timber
- Which will reduce the number of people ✓

OR

- No habitat for wildlife ✓/ Fruit as food for wildlife
- Which would reduce the number of animals ✓ (2)

2.4.3
- A plasmid is removed from the bacteria ✓
- it is spliced open ✓ using an enzyme
- the desired gene is extracted ✓
- and inserted into the plasmid ✓
- the plasmid is placed back into the bacteria ✓ (5)

2.4.4
- They can become invasive ✓ because they are no longer.
- controlled by the disease ✓ (2)

2.4 2.5.1 Metaphase 1 ✓ (1)

2.5.2
- Spindle fibre shorten ✓
- Centromere splits separating each chromosome into two ✓
- daughter chromosomes are pulled to opposite poles ✓ (3)

2.5.3 ovaries ✓ (1)

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QUESTION 3

3.1 3.1.1 Pedigree diagram ✓ (1)

3.1.2 Mutation/gene for disease found on the X/sex chromosomes/ gonosomes ✓ (1)

3.1.3 4 ✓ (1)

3.1.4 recessive ✓ (1)

3.1.5
- Individuals 2 / 7 / 10 do not have Menkes syndrome ✓
- however, they (2 / 7 / 10) carry the allele ✓
- because they have a child 5 /13 / 15 who has Menkes syndrome ✓ (3)

3.1.6 (a) $\mathbf{X^R X^r}$ ✓ (1)

(b) $\mathbf{X^r Y}$ ✓ (1)

3.1.7

P_1 Phenotype: Male with Menkes Syndrome x Normal Female ✓

Genotype: $\mathbf{X^r Y}$ x $\mathbf{X^R X^R}$ ✓

Meiosis

G/gametes: $\mathbf{X^r}$, $\mathbf{Y}$ x $\mathbf{X^R}$, $\mathbf{X^R}$ ✓

Fertilisation

F_1 Genotype: $\mathbf{X^R X^r}$: $\mathbf{X^R X^r}$: $\mathbf{X^R Y}$: $\mathbf{X^R Y}$ ✓

Phenotype: 2 Normal females: 2 Normal males ✓
*0% chance for the next child to have Menkes syndrome ✓

P_1 and F_1 ✓
Meiosis and fertilisation ✓

***1 compulsory** + Any 5

OR

P_1 Phenotype: Male with Menkes Syndrome x Normal Female ✓

Genotype: $\mathbf{X^r Y}$ x $\mathbf{X^R X^R}$ ✓

Meiosis

G/gametes	$\mathbf{X^r}$	$\mathbf{Y}$
$\mathbf{X^R}$	$\mathbf{X^R X^r}$	$\mathbf{X^R Y}$
$\mathbf{X^R}$	$\mathbf{X^R X^r}$	$\mathbf{X^R Y}$

Fertilisation

1 mark for correct gametes ✓
1 mark for correct genotypes ✓

Phenotype: 2 Normal females: 2 Normal males ✓
*0% chance for the next child to have Menkes syndrome ✓

P_1 and F_1 ✓
Meiosis and fertilisation ✓

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

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3.1.8
- Males only have 1 X chromosome ✓ / XY
- If they carry the Menkes syndrome allele on the X chromosome they will have the disease ✓ (2)

3.2 3.2.1 (a) Eustachian tube ✓ (1)
(b) Round window ✓ (1)

3.2.2 (a) G ✓ – auditory canal ✓ (2)
(b) B ✓ – semi-circular canals ✓ (2)

3.2.3 (a)
- **The fluid in the middle ear prevents the ossicles vibrating freely** ✓*
- Therefore less/no vibrations are transmitted to the oval window ✓
- Less/no pressure wave are set up in the inner ear ✓
- The organ or corti is stimulated less ✓/not stimulated.
- Impulse is not sent on the auditory nerve to the cerebrum to be interpreted ✓

(***1 Compulsory** + Any 3) (4)

(b) Tympanic membrane ✓/ear drum (1)

3.3 3.3.1 (a) cerebellum ✓ (1)
(b) Medulla oblongata ✓ (1)

3.3.2 Connects/allows communication between the left and right hemisphere of the cerebrum ✓✓ (2)

3.3.3 **A** ✓ – cerebrum ✓ (2)

3.3.4
- The cerebellum is damaged ✓
- Due to no coordination of the voluntary movements ✓ by the cerebellum
- The cerebellum is responsible or balance and coordination ✓ (3)

3.4 3.4.1 to gain muscle strength, shape and performance ✓ (1)

3.4.2 (a) Male fertility ✓ (1)

(b) AAS ✓ (not effect of AAS) (1)

3.4.3 same age ✓ of males
same amount of AAS ✓ taken (2)

3.4.4
- Acts as a control ✓
- To show the results obtained by Group B ✓
- Are caused by the AAS ✓
- And not by the exercise ✓ (Any 3 x 1) (3)

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3.4.5 The higher the level of testosterone ✓ the higher the sperm count ✓
Testosterone stimulates the production of sperm ✓ (3)

3.4.6 High temperatures ✓ would cause sperm to not mature ✓/be deformed (2)
[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150

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