



**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

JUNE 2024

**LIFE SCIENCES
MARKING GUIDELINE**

MARKS: 150

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.

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.

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)

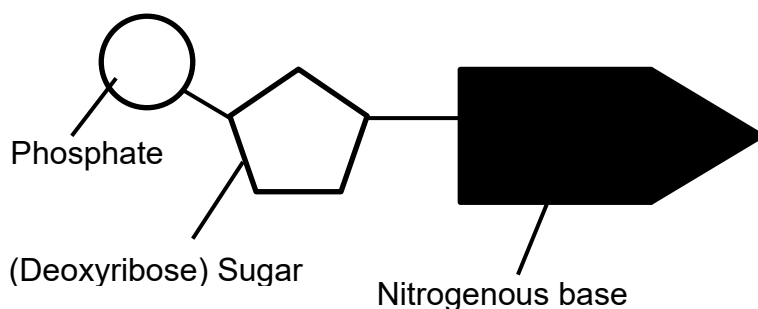
2.1.3 Sample 1 ✓ (1)

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)

- 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)
- [50]**

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) $X^R X^r$ ✓ (1)
- (b) $X^r Y$ ✓ (1)

3.1.7

P_1	Phenotype	Male with Menkes Syndrome	x	Normal Female ✓
	Genotype	$X^r Y$	x	$X^R X^R$ ✓
<i>Meiosis</i>	G/gametes	X^r , Y	x	X^R , X^R ✓
<i>Fertilisation</i>				
F_1	Genotype	$X^R X^r$: $X^R X^r$: $X^R Y$: $X^R Y$ ✓		
	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	$X^r Y$	x	$X^R X^R$ ✓

Meiosis

G/gametes	X^r	Y
X^R	$X^R X^r$	$X^R Y$
X^R	$X^R X^r$	$X^R Y$

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)

- 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 of 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 for 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)

- 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