NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES PRE-MIDYEAR EXAMINATION ASSESSMENT MARKING GUIDELINES: MAY 2023.

Total Marks: 150
Duration: 2,5 HOURS

These marking guidelines consist of 9 pages including the cover page.

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 part of it is required**
   Read all and credit relevant part.

4. **If comparisons are asked for but descriptions are given**
   Accept if 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 is incorrect, do not credit. If sequence and links becomes correct again, resume credit.

9. **Non-recognized abbreviations**
   Accept if first defined in answer. If not defined, do not credit the unrecognised abbreviation but credit the rest of answer if correct.

10. **Wrong numbering**
    If answer fits into the correct sequence of questions but the wrong number is given, it is acceptable. Indicate that the candidate's numbering is wrong.

11. **If language used changes the intended meaning**
    Do not accept.

12. **Spelling errors**
    If recognizable accept 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 name is given (and vice versa)**
No credit.

15. **If units are not given in measurements**
Memorandum will allocate marks for units separately, except where it is already given in the question.

16. Be sensitive to **the sense of an answer, which may be stated in a different way**.

17. **Caption**
Credit will be given for captions to all illustrations (diagrams, graphs, tables, etc.) except where it is already given in the question.

SECTION A			
QUESTION 1			
1.1	1.1.1	B✔✔	
	1.1.2	C✔✔	
	1.1.3	B✔✔	
	1.1.4	B✔✔	
	1.1.5	C✔✔	
	1.1.6	D✔✔	
	1.1.7	B✔✔	
	1.1.8	A✔✔	
	1.1.9	C✔✔	
	1.1.10	B✔✔	
		(10 x 2)	**(20)**
1.2	1.2.1	Crossing over✔	1
	1.2.2	Scrotum✔	1
	1.2.3	Endometrium✔	1
	1.2.4	Epididymis✔	1
	1.2.5	Diploid✔	1
	1.2.6	Meiosis✔	1
	1.2.7	Reflex action✔	1
	1.2.8	Meninges✔	1
		(8 x 1)	**(8)**
1.3	1.3.1	B only✔✔	
	1.3.2	A only✔✔	
	1.3.3	B only✔✔	
	1.3.4	B only✔✔	
		(4 x 2)	**(8)**
1.4	1.4.1	(a) Hypophysis✔/Pituitary gland	1
		(b) Adrenal✔ gland	1
	1.4.2	(a) D✔ – Testis✔	2
		(b) C✔ – Pancreas✔/Islets of Langerhans	2
		(c) A✔ – Hypophysis✔/Pituitary gland	2
			(8)
1.5	1.5.1	Motor✔ neuron	1
	1.5.2	(a) Nucleus✔/nuclear membrane	1
		(b) Cytoplasm✔	1
		(c) Dendrite✔	1
	1.5.3	(a) C✔ - Axon✔	2
			(6)
		TOTAL SECTION A	**50**

SECTION B QUESTION 2			
2.1	2.1.1	(a) DNA ✓ (b) Ribosome ✓	1 1
	2.1.2	(a) G ✓ (b) U ✓	1 1
	2.1.3	– DNA codes for a particular protein ✓ but cannot leave nucleus – One strand of DNA is used as a template ✓ – to form mRNA ✓	3
	2.1.4	– According to the codons on mRNA ✓ – tRNA molecules with matching anticodons ✓ – bring the required amino acids to the ribosome ✓ – This is called translation ✓ – The amino acids become attached by peptide bonds ✓ – to form the required protein ✓ (any 4)	4
	2.1.5	- A gene mutation affects arrangement/type of the nitrogen bases/nucleotides✓ - This changes the code on the DNA ✓ - which changes the code on the RNA✓ - A different amino acid✓ may be coded for - which causes a change in the amino acid sequence in✓ the protein - leading to the formation of a different/alternate/no protein✓ ANY 5	5
			(16)
2.2	2.2.1	23✓	1
	2.2.2	(a) Centromere✓ (b) Chiasma✓/chiasmata	1 1
	2.2.3	Ovary✓	1
	2.2.4	(a) Crossing over✓ (b) Prophase I✓ (c) ova✓/gametes/sex cells	1 1 1
	2.2.5	C→ B→ A✓(correct sequence)	1
			(8)
2.3	2.3.1	(a) White✓fur (b) Black✓fur	

	2.3.2	(a) 1✓ and 3✓
		     (Mark first TWO only)
		(b) 1✓
		     (Mark first ONE only)
			2
			1

	2.3.3	**P₁** Phenotype Black X White ✓	
		Genotype BB X bb ✓	

P_1

P₁ Phenotype   Black   X   White ✓

Genotype   BB   X   bb ✓

Meiosis

G/gametes   B, B   X   b, b ✓

Fertilisation

F₁ Genotype   Bb;   Bb,   Bb;   Bb ✓

Phenotype   All black
*0 ✓ %white

P_1 and F_1 ✓
Meiosis and fertilisation ✓

(*compulsory mark + 5)

OR

P₁ Phenotype   Black   X   White ✓

Genotype   BB   X   bb ✓

Meiosis

Fertilisation

Gametes	B	B
b	Bb	Bb
b	Bb	Bb

1 mark for correct gametes
1 mark for correct genotypes

F₁ Phenotype   All black
*0 ✓ % white

P_1 and F_1 ✓
Meiosis and fertilisation ✓

(* compulsory mark + 5)

6

(11)

2.4	2.4.1	(a) $X^A Y$ ✓✓		2
		(b) $X^A X^a$ ✓✓		2
	2.4.2	$\left[\dfrac{3}{7} \times 100 \quad ✓\right] = 42{,}86 ✓ /42{,}9/43\%$		2
	2.4.3	- An affected female carries two/only recessive alleles ✓ / $X^a X^a$ - Sons/males inherit one X chromosome ✓ from their mothers - Sons/males need only one recessive allele to be affected ✓ - And therefore must inherit X^a from their mother ✓ Any 3		3
				(9)
2.5	2.5.1	Contain the same chromosomes ✓ because the embryonic cell has divided by mitosis ✓ / they are all produced from nuclei of the donor sheep ✓ which multiply / divide by mitosis ✓ therefore have the same DNA ✓		2

	2.5.2	The nucleus and genetic material ✓ originated from another sheep ✓ / the nuclei of the foster sheep were not used ✓ and therefore did not contain the same genetic material / the ova used did not contain nuclei ✓ / it is the nucleus which contains the genetic material ✓	2
	2.5.3	Animals or plants with superior / favourable characteristics ✓ can be produced to enhance food production ✓ / biotechnology.	2
			(6)
			[50]
QUESTION 3			
3.1	3.1.1	C✓ – Medulla Oblongata✓	2
	3.1.2	A ✓ - Cerebrum✓	2
	3.1.3	D✓ - Cerebellum✓	2
			(6)
3.2	3.2.1	A ✓ – aqueous humour / fluid ✓	2
	3.2.2	F ✓ – yellow spot / fovea centralis ✓	2
	3.2.3	B ✓ – iris ✓	2
			2
			(6)
3.3	3.3.1	A – Tympanic membrane✓/ Tympanum/Eardrum C – Oval window✓/fenestra ovalis D – Round window✓/fenestra rotunda	3
	3.3.2	B – transmit vibrations✓ from the tympanic membrane to inner ear/ amplifies sound waves D – prevents pressure build up of waves✓/absorbs pressure wave set up by tympanic canal of the inner ear/eases sound waves out of inner ear/ prevents sound waves from moving backwards in perilymph	2
	3.3.3	Tympanic membrane/A has a larger surface area✓ than the oval window✓/C	2
	3.3.4	Ossicles will not vibrate freely ✓ to transmit vibrations to the inner ear✓/ causing partial deafness **OR** Cannot equalise pressure ✓ on either side of tympanic membrane leading to pain✓/ middle ear infection/ a burst eardrum / vibrations not being transmitted/ partial deafness Any (1 x 2)	2
			(9)

3.4	3.4.1	External ✓ fertilization	1
	3.4.2	- A large amount of sperm is released ✓ - A large amount of eggs is released ✓ - The male and female swim close to each other ✓/the sperm is released close to the eggs (Any 2) **(Mark first TWO only)**	2
	3.4.3	- No danger of drying out ✓	2
			(5)
3.5	3.5.1		6

Graph to show the relationship between ages of women and the percentage of pregnancies per month

Mark allocation of the graph

Criteria	Mark Allocation
Correct type of graph drawn for the pregnancies per month only	1
Title of graph including the two variables (Age of women and pregnancies per month)	1
Correct label and unit for X-axis and Y-axis	1
Correct scale for X-axis and Y-axis	1
Drawing of the graph	0: No points plotted correctly 1: 1 to 4 points plotted correctly 2: All 5 points plotted correctly

	3.5.2	The older the women, the higher the chances of having miscarriages✓✓ **OR** The younger the women, the lower the chances of having miscarriages✓✓	2
			(8)
3.6	3.6.1	A – Middle piece ✓ B—acrosome ✓	1 1
	3.6.2	Mitochondria : ✓supplies energy ✓ for locomotion of the sperm cell Tail : ✓can propel forward ✓for swimming/locomotion of the sperm cell.Torpedo shape : ✓reducing friction ✓ **(MARK FIRST TWO ONLY)**	4
			6
3.7	3.7.1	(a) Amount of thyroxin✓ (b) Body weight✓	1 1
	3.7.2	- Same number of rats in each group✓ - All rats were of the same species✓ - All groups were investigated for the same period of time✓ - All rats were the same gender✓ - All groups were weighed after the same interval✓ (Any 3) **(Mark first THREE only)**	3
	3.7.3	Group A✓	1
	3.7.4	- Low thyroxin levels✓ - will lead to low metabolic rate✓ - Therefore the energy from the diet is used very slowly✓ - and more organic compounds are stored✓ (Any 3)	3
	3.7.5	Group B✓	**1**
			(10)
			[50]
		GRAND TOTAL	**150**