Province of the
EASTERN CAPE
EDUCATION

# NATIONAL SENIOR CERTIFICATE

## GRADE 12

## SEPTEMBER 2022

# LIFE SCIENCES P2
# MARKING GUIDELINE

**MARKS: 150**

This marking guideline consists of 10 pages.

## PRINCIPLES RELATED TO THE MARKING OF 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 a part of it is required**
   Read all and credit the relevant parts.

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.

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 | A ✓✓ | | |
| | 1.1.2 | C ✓✓ | | |
| | 1.1.3 | B ✓✓ | | |
| | 1.1.4 | C ✓✓ | | |
| | 1.1.5 | C ✓✓ | | |
| | 1.1.6 | A ✓✓ | | |
| | 1.1.7 | A ✓✓ | | |
| | 1.1.8 | D ✓✓ | | |
| | 1.1.9 | A ✓✓ | | |
| | 1.1.10 | D ✓✓ | (10 x 2) | (20) |
| 1.2 | 1.2.1 | Chiasma ✓/ chiasmata | | |
| | 1.2.2 | Gene ✓ | | |
| | 1.2.3 | Interphase ✓ | | |
| | 1.2.4 | Mitochondrial DNA ✓ | | |
| | 1.2.5 | DNA profile ✓ | | |
| | 1.2.6 | Punctuated equilibrium ✓ | | |
| | 1.2.7 | Population ✓ | | |
| | 1.2.8 | (Biological) evolution ✓ | (8 x 1) | (8) |
| 1.3 | 1.3.1 | A only ✓✓ | | |
| | 1.3.2 | B only ✓✓ | | |
| | 1.3.3 | B only ✓✓ | (3 x 2) | (6) |
| 1.4 | 1.4.1 | 4 ✓ | | (1) |
| | 1.4.2 | (a) Male without albinism ✓ | | (1) |
| | | (b) nn ✓✓ | | (2) |
| | | (c) Nn ✓✓ | | (2) |
| | 1.4.3 | 75 ✓✓% | | (2) |
| 1.5 | 1.5.1 | (Double) Helix ✓ | | (1) |
| | 1.5.2 | (a) Deoxyribose ✓ | | (1) |
| | | (b) Adenine ✓ | | (1) |
| | | (c) Hydrogen ✓ bond | | (1) |
| | 1.5.3 | • Double stranded ✓<br>• Has thymine ✓ not uracil<br>• Nitrogenous bases are in pairs ✓<br>**(Mark first TWO only)** | (Any 2 x 1) | (2) |
| | 1.5.4 | Nucleus ✓<br>Mitochondrion ✓<br>**(Mark first TWO only)** | | (2) |
| | | | **TOTAL SECTION A:** | **50** |

## QUESTION 2

2.1 2.1.1 GGG - CCA- AGU ✓✓ (ALL or NONE) (2)

2.1.2 Glycine ✓ - Proline ✓ - Serine ✓ (3)

2.1.3
- The codon would change to UGG ✓
- The anticodon with ACC ✓
- will bring the tryptophan ✓
- instead of glycine ✓
- sequence of amino acids will change ✓ /a different protein will form (Any 4 x 1) (4)

2.1.4
- Each tRNA carries a specific amino acid ✓
- to the codon on the mRNA ✓/ ribosome (2)

2.1.5

| DNA Replication | Transcription |
|---|---|
| Two DNA strands are used as template ✓ | One DNA strand is used as template ✓ |
| Free DNA nucleotides join ✓ to DNA template | Free RNA nucleotides join ✓ to DNA template |
| Whole DNA unwinds | A part of DNA unwinds |
| A pairs with T | A pairs with U |

Table ✓

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

2.2 2.2.1 The number and appearance/type of chromosomes in the cell of an organism. ✓✓ (2)

2.2.2 8 ✓ (1)

2.2.3
- Females are XX ✓
- and males are XY ✓ (2)

2.3 2.3.1
- When two homozygous organisms with contrasting characteristics are crossed, ✓
- all the individuals of the F1 generation will display the dominant trait ✓

**OR**

- An individual that is heterozygous for a particular characteristic ✓
- will have the dominant trait as the phenotype ✓ (Any 1 x 2) (2)

2.3.2

| | | | | |
|---|---|---|---|---|
| **$P_1$** | Phenotype | Red-eyed female | x | White-eyed male ✓ |
| | Genotype | $X^R X^r$ ✓ | x | $X^r Y$ ✓ |
| Meiosis | | | | |
| | **G**/gametes | $X^R$ , $X^r$ | x | $X^r$ , Y ✓ |
| Fertilisation | | | | |
| **$F_1$** | Genotype | $X^R X^r$ ; $X^R Y$ ; $X^r X^r$ ; $X^r Y$ ✓* | | |
| | Phenotype | 1 Red-eyed female : 1 red-eyed male: 1 white-eyed female : 1 white-eyed male ✓* | | |

$P_1$ and $F_1$ ✓
Meiosis and fertilisation ✓ (**Any 5 + *2 Compulsory)**

**OR**

| | | | | |
|---|---|---|---|---|
| **$P_1$** | Phenotype | Red eyed female | x | White eyed male ✓ |
| | Genotype | $X^R X^r$ ✓ | x | $X^r Y$ ✓ |
| Meiosis | | | | |
| | **G**/gametes | $X^R$, $X^r$ | x | $X^r$, Y ✓ |

Fertilisation
**$F_1$**

| Gametes | $X^r$ | **Y** |
|---|---|---|
| **$X^R$** | $X^R X^r$ | $X^R Y$ |
| **$X^r$** | $X^r X^r$ | $X^r X^r$ |
| Correct genotypes ✓* | | |

Phenotype 1 Red eyed female: 1 red eyed male: 1 white eyed female: 1 white eyed male ✓*

$P_1$ and $F_1$ ✓
Meiosis and fertilisation ✓ (**Any 5 + *2 Compulsory)** (7)

2.4 2.4.1 Continuous ✓ variation (1)

2.4.2 There is a range of intermediate phenotypes ✓✓/heights (2)

2.4.3
- Plant breeders/people select ✓ characteristic and
- not nature selecting ✓ characteristic
- They select those characteristics that are desirable to them ✓/ people
- and is not beneficial to survival ✓ (2 x 2) (4)

2.4.4 Incomplete ✓ dominance (1)

2.4.5 Yes ✓

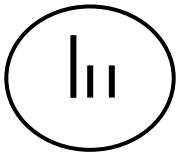
- The orange flowers carry one red allele ✓/ are heterozygous
- If both plants pass on one red allele ✓ the offspring will be red (3)

2.5 2.5.1 Anaphase 1 ✓ (1)

2.5.2 Chromosomal ✓mutation (1)

2.5.3
- A gamete with an extra copy of chromosome 21 ✓ will be formed
- If this gamete fuses with a normal gamete ✓/ gamete with 23 chromosomes
- A zygote with 47 chromosomes ✓/ an extra copy of chromosome 21 will be formed
- This will lead to Down syndrome ✓ (4)

2.5.4



- Three single stranded chromosomes drawn ✓
- Correct size of three chromosomes ✓ (2)

2.5.5
- Sperm ✓ cells / spermatozoa (1)

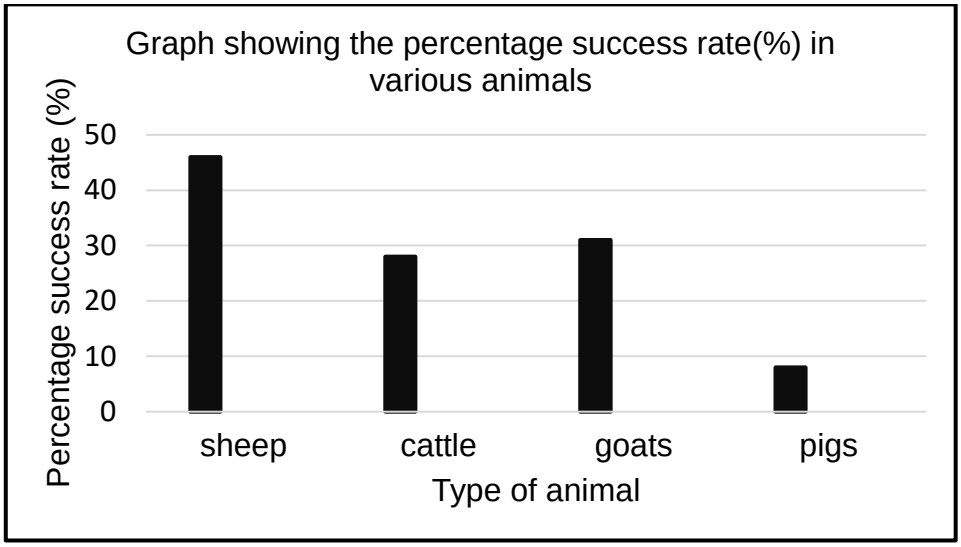
**[50]**

## QUESTION 3

3.1 3.1.1 Many embryos were transferred into the surrogate mothers ✓/ large sample size of embryos was used. (1)

3.1.2 Success rate of cloning ✓ (1)

3.1.3




**Guideline for assessing graph**

| CRITERIA | ELABORATION | MARK |
|---|---|---|
| Correct type of graph (T) | Bar graph | 1 |
| Caption of Graph (C) | Both variables included | 1 |
| Axes labels (L) | *x*- and *y*-axis correctly labelled | 1 |
| Scale for *x*- and *y*-axis | Equal space between bars and width of bars for x-axis and<br>-correct scale for *y*-axis | 1 |
| Plotting of bars | 1 to 3 bars plotted correctly<br>All 4 bars plotted correctly | 1<br>2 |

(6)

3.1.4 - Produce organisms with desired traits ✓ e.g. health; appearance; nutritious; yield; shelf-life; etc.
- Conservation of threatened species ✓
- To create tissues/organs for transplant ✓
- Replace damaged tissue ✓
- Prevent genetic diseases ✓
- Improve food supply/quality ✓

**Mark first ONE only** (Any 1 x 1) (1)

3.1.5 The cost of cloning is very high ✓/ costs R300 000
The meat would be too expensive ✓
The success rate is low ✓/ success rate is 28%
It would take a long time/effort to produce each cow. ✓ (4)

3.2 3.2.1
- Elephants normally eat grass, leaves, fruit, bark of trees and the roots of legumes. ✓ (1)

3.2.2 $\frac{33}{100}$ ✓ x 91 ✓ = 30 ✓ female elephants (3)

3.2.3
- There is a great deal of variation amongst the population of elephants ✓
- Some have tusks, and some do not ✓
- When there was an increase in poaching ✓
- Elephants without tusks, survived ✓
- whilst elephants with tusks, were killed ✓
- The elephants that survived, reproduced ✓
- and pass on the allele for the favourable characteristic to their offspring ✓
- The next generation therefore had a higher proportion of individuals without tusks. ✓ (Any 5 x 1) (5)

3.2.4
- There will be more legumes and trees ✓
- and less grass ✓
- as elephants now eat more grass ✓/less legumes/ less bark (Any 2 x 1) (2)

3.3 3.3.1
- Is more prognathous ✓
- Have smaller cranium ✓
- Have larger jaws ✓
- Have more U-shape jaw ✓
- Have prominent brow ridges ✓ (Any 2 x 1)

(**Mark first TWO only)** (2)

3.3.2
- They ate more raw food ✓
- and therefore, have large teeth ✓ to tear and rip (2 x 1) (2)

3.3.3 The hole at the base of the skull where the spinal cord leaves/enters the skull. ✓ (1)

3.3.4
- In *Homo sapiens* the foramen magnum is in a forward position ✓
- therefore, are bipedal ✓
- In the gorilla the foramen magnum is in a backward position ✓
- therefore, are quadrupedal ✓/not bipedal (4)

3.3.5
- *Homo sapiens* have a larger brain ✓
- and therefore, more intelligent ✓ (2)

3.4
- *Oldest* fossils of *Ardipithecus* found in Africa ONLY ✓
- *Australopithecus* fossils found in Africa ONLY ✓
- fossils of *Homo habilis* found in Africa ONLY ✓
- Oldest fossils of *Homo erectus found in Africa* ✓
- Oldest fossils of *Homo sapiens* found in Africa ✓
- while the younger fossils of *Homo erectus* / *Homo sapiens* were found in other parts of the world ✓ (Any 5 x 1) (5)

3.5 3.5.1 Phylogenetic tree ✓ (1)

3.5.2 5 ✓ (1)

3.5.3 1 mya ✓ (1)

3.5.4 *Australopithecus africanus* ✓ (1)

3.5.5
- There is no direct line from *Homo erectus* to *Homo sapiens* ✓ because
- *Homo erectus* and *Homo sapiens* both evolved from a *common ancestor* ✓ (2)

3.5.6 *Homo neanderthalensis* ✓ (1)

3.5.7 Prof. Lee Burger ✓ (1)

3.5.8 Sterkfontein Caves ✓/Cradle of Humankind
Taung ✓ (2)

**[50]**

**TOTAL SECTION B: 100**
**GRAND TOTAL: 150**