education

Department of
Education
FREE STATE PROVINCE

NATIONAL
SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P1

Memorandum

June 2011

MARKS: 150

TIME: 2½ hours

This memorandum consists of 9 pages.

PRINCIPLES RELATED TO MARKING LIFE SCIENCES 2011

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 and 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.

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 given in terminology**
Accept provided it was accepted at the National memo discussion meeting.

14. **If only letter is asked for and only name is given (and vice versa)**
No credit

15. **If units are not given in measurements**
Candidates will lose marks. Memorandum 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 appears 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.

19. No changes must be made to the marking memoranda without consulting the Provincial Internal Moderator

SECTION A

QUESTION 1

1.1   1.1.1 C✓✓
          1.1.2 A✓✓
          1.1.3 B✓✓
          1.1.4 C✓✓
          1.1.5 D✓✓
          1.1.6 D✓✓
          1.1.7 C✓✓
          1.1.8 C✓✓
          1.1.9 D✓✓

                                                                    2 X 9   **(18)**

1.2   1.2.1 allele✓
          1.2.2 locus✓
          1.2.3 incomplete dominance✓
          1.2.4 heterozygous✓
          1.2.5 plasmid✓
          1.2.6 polyploidy✓

                                                                    1 X 6 **(6)**

1.3   1.3.1 B only ✓✓
          1.3.2 Both/A and B ✓✓
          1.3.3 A only ✓✓
          1.3.4 Both/A and B ✓✓
          1.3.5 A only✓✓
          1.3.6 A only ✓✓
          1.3.7 A only ✓✓
          1.3.8 B only ✓✓   2 X 8 **(16)**

1.4   1.4.1
                 C – Nuclear membrane✓
                 D – Centrosome✓/centriole
                 E – Homologous chromosomes✓   (3)

          1.4.2 Spindle threads contract✓ to move chromosomes✓ towards
                 opposite poles/Allow for the attachment of chromosomes   (any 1 x 2)   (2)

          1.4.3 Metaphase✓ 1✓   (2)

          1.4.4 Chromosomes arranged along the equator✓ in homologous pairs✓   (2)

          1.4.5 4✓   (1)

                                                    TOTAL SECTION A: 50

QUESTION 2

2.1
2.1.1 Individual B✓ (1)
2.1.2 It has a large X chromosome✓ (1)

2.1.3 Down syndrome✓ (1)

2.1.4 small almond-shaped eyes/ ears situated lower than usual/ flat forehead/ short

and stubby toes/ poor muscle tone/ flat nose bridge/ large tongue/ mental

retardation **any THREE 3x1** (3)

2.1.5 Normal female: Chromosome pair 23 = XX ✓
Female with Turner's syndrome: Only one X✓ chromosome (2)

2.1.6 She will not be able to have children✓ since her sex organs will not develop✓✓/
no menstrual cycle because there are underdeveloped
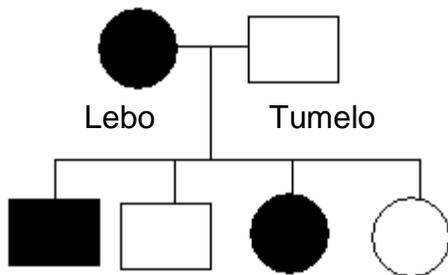gonads and therefore no hormones (2)

(10)

2.2
2.2.1 (a) Lebo aa✓ (1)

(b) Themba – aa✓ (1)

2.2.2 AA✓ OR Aa ✓ (2)

2.2.3

Mark Allocation
One mark for both parents correct✓
One mark for diagram✓
Two marks if all 4 genotypes are indicated✓✓

(4)

2.2.4 Yes, they can reconsider. ✓/ No they must not have children - Consider genetic
councelling as 50% possibility of albino chidren. ✓ (2)

(10)

2.3.1 **P₁**   phenotype   'Hitch-hikers' thumb x normal thumb✓

genotype   HH x hh✓

Meiosis

G   H,H   x   h,h ✓

gametes	H	H
h	Hh	Hh
h	Hh	Hh

Fertilisation   **OR**

F₁   genotype all Hh ✓

phenotype all 'hitch-hickers'thumbs✓

1 mark for stating P₁ and F₁
1 mark for stating meiosis and fertilisation   any   **(6)**

2.3.2 When one allele masks✓the action of the other allele✓ so that the characteristic
of the dominant✓ is visible in the phenotype✓   (4)
                                                                                (10)

                                                    TOTAL QUESTION 2:   30

QUESTION 3

3.1

3.1.1

Homo sapiens	*Chimpanzee*
1. Larger cranium✓/brain	1. Smaller cranium ✓/brain
2. Flat face✓/ Forehead slope less backwards	2. Face sloping✓/ Foreheads slope much backwards
3. Foramen magnum forward✓/ bottom of the skull	3. Foramen magnum at the back of the skull✓
4. Brow ridges are not as pronounced✓	4. Brow ridges pronounced✓
5. Smaller canines✓	5. Larger canines✓
6. Smaller spaces between the teeth	6. Larger spaces between the teeth
7. Jaws with teeth on a gentle/ round curve✓	7. Jaws with teeth in a rectangular/ U shape✓
8. Less protruding jaws✓	8. More protruding jaws✓/ prognathous
9. Lower jaw has a well developed chin✓	9. Lower jaw has poorly developed chin✓

(Mark first FOUR answers only)   (any 2 x 2 = 4 + 1 **for table**)   (5)

3.1.2 Mrs Ples✓, Taung child✓, Karabo✓   (2)

3.1.3 - Upright posture✓
- Long upper arms✓
- Freely rotating arms✓
- Elbow joints allowing rotation of forearm✓
- Rotate hands at least 180⁰✓
- Flat nails instead of claws✓/bare finger tips
- Opposable thumbs✓ which work in opposite direction to their fingers
- Large brains/skulls compared to their body mass✓
- Eyes in front✓/binocular vision/stereoscopic vision
- Eyes with cones✓/colour vision
- Sexual dimorphism✓/distinct differences between male and female
- Olfactory brain centres reduced✓/reduced sense of smell
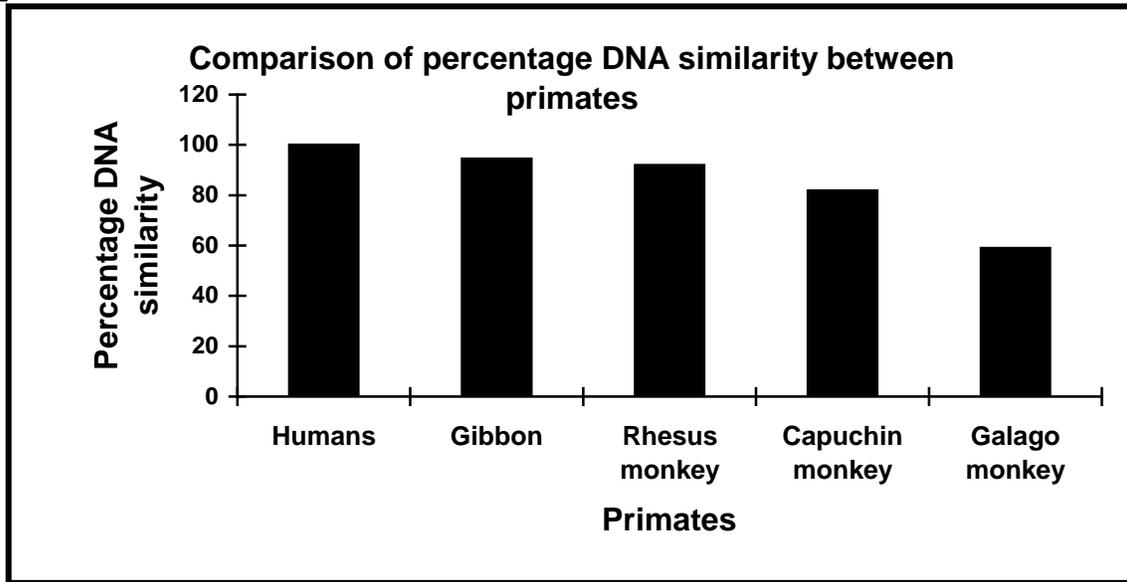- Parts of the brain that process information from the hands and eyes are enlarged✓
- Two mammary glands only✓
(Mark first FOUR answers only)   any   (4)
                                                            (11)

3.2   The population will split up into two groups✓ /go to different island or environment on an island
-      each group undergoes natural selection ✓independently✓ to the new environment✓
-      each group may become genotypically✓
-      and phenotypically different✓
-      which might prevent them from interbreeding✓/become reproductively isolated leading to the formation of a new species✓

                                                any   (5)

3.3.1   The higher ✓the percentage of DNA✓ comparison the more related✓ is the organismes .   (3)

3.3.2

Comparison of percentage DNA similarity between primates

(Bar graph with Y-axis "Percentage DNA similarity" from 0 to 120, X-axis "Primates")

Primate	Approximate value
Humans	100
Gibbon	95
Rhesus monkey	92
Capuchin monkey	82
Galago monkey	60

Rubric for the mark allocation of the graph

Correct type of graph	1
Title of graph	1
Correct label and units for X-axis	1
Correct label and units for Y-axis	1
Appropriate width and interval of bars	1
Appropriate scale for Y-axis	1
Drawing of the graphs	1: 1 to 2 bars plotted correctly 2: 3 to 4 bars plotted correctly 3: all 5 bars plotted accurately

                                                  (9)

NOTE:
If the wrong type of graph is drawn: marks will be lost for 'correct type of graph'If graphs are not drawn on the same system of axes, mark the first graph only using the given criteria

3.2.4   Apes and monkeys are genetically similar✓ to humans✓.   (2)

                                                       (14)

                              TOTAL QUESTION 3:   30

QUESTION 4

4.1   A -   Bacterium reproducing✓
         B -   In the population a mutation happen that makes the bacterium
               resistant to penicillin✓.
         C -   Mutant bacterium survive the penicillin treatment and reproduce✓
         D -   Most of population is killed by penicillin✓
         E -   Population now resistant to penicillin✓   **(5)**

4.2
4.2.1   (i)   dark-coloured✓   (1)
         (ii)   light- coloured✓   (1)

4.2.2   The dark –coloured moth were better camouflaged✓against the darker trees of the polluted forest✓and therefore less✓ were seen and caught by predators✓. More✓ dark-coloured moths were recaptured✓because more of them survived✓
                                          Any 6   (6)

4.2.3   To serve as a control✓ that can prove that the dark-coloured moths are not just caught more easily✓than the light-coloured ones.   (2)

4.2.4

Natural selection	Artificial selection
• The environment is the selection pressure✓.	• Human are the trigger for change✓.
• The selected characteristics increase the chances of survival in the natural environment. ✓	• The selected characteristics do not necessarily increase the chances of survival in the natural environment. ✓
• It is a slow process. ✓	• It is a faster process. ✓

                      (any 2 x 2 = 4 + 1 **for table**)   (5)
                                                   (15)

4.3   Process of transcription✓ and translation✓
 - Part of the DNA double helix unwinds✓ in the nucleus
 - The hydrogen bonds✓ of DNA break, ✓ resulting in two separate strands✓
 - One strand is used as a template✓
 - mRNA nucleotides✓ pair up with their complementary bases✓ on one strand of DNA to from a strand of mRNA✓
 - A – U✓
 - C - G✓
 - DNA is copied into RNA. ✓This is called transcription.
 - mRNA leaves the nucleus through the nuclear pores. ✓
 - mRNA attaches to the ribosome✓
 - tRNA molecules in the cytoplasm pick up specific amino acids according to their anticodons. ✓
 - tRNA molecules line up with their amino acids along the mRNA ✓ so that the anticodons match the codons on the mRNA. ✓
 - Peptide bonds form between the adjacent amino acids. ✓ This is called translation. A long chain of amino acids forms called a polypeptide. ✓
 - Each tRNA releases its amino acids✓ and returns to the cytoplasm to pick up another amino acid. ✓

                                                                     Maximum (17)

Synthesis

Marks	Description
3	Well structured – demonstrates insight and understanding of question
2	Minor gaps in the logic and flow of the answer
1	Attempted but with significant gaps in the logic and flow of the answer
0	Not attempted/nothing written other than question number

                                                        Synthesis   (3)
                                                                            (20)
                                                                            [40]
                                                  GRAND TOTAL: 150