basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P2

FEBRUARY/MARCH 2015

MEMORANDUM

MARKS: 150

This memorandum consists of 12 pages.

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 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 is incorrect, do not credit. If sequence and links becomes correct again, resume credit.

9. **Non-recognized abbreviations**
   Accept if first defined in the 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 recognizable 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. 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. **Changes to the marking memorandum**
No changes must be made to the marking memoranda without consulting the Provincial Internal Moderator who in turn will consult with the National Internal Moderator (and the Umalusi moderators where necessary).

20. **Official memoranda**
Only memoranda bearing the signatures of the National Internal Moderator and the Umalusi moderators and distributed by the National Department of Basic Education via the provinces must be used.

SECTION A

QUESTION 1

1.1	1.1.1	D✓✓		
	1.1.2	B✓✓		
	1.1.3	B✓✓		
	1.1.4	D✓✓		
	1.1.5	A✓✓		
	1.1.6	C✓✓		
	1.1.7	B✓✓		
	1.1.8	A✓✓		
	1.1.9	A✓✓		
	1.1.10	D✓✓	(10 x 2)	**(20)**
1.2	1.2.1	Homologous✓		
	1.2.2	Genome✓		
	1.2.3	DNA profile✓/fingerprint		
	1.2.4	Albinism✓		
	1.2.5	Peptide✓ bonds		
	1.2.6	Karyotype ✓/Karyogram		
	1.2.7	Nuclear pores✓		
	1.2.8	Clone✓		
	1.2.9	Hypothesis✓		
	1.2.10	Biogeography✓	(10 x 1)	**(10)**
1.3	1.3.1	Both A and B ✓✓/Both/A and B		
	1.3.2	Both A and B ✓✓/Both/A and B		
	1.3.3	A only✓✓		
	1.3.4	B only✓✓		
	1.3.5	Both A and B ✓✓/Both/A and B		
	1.3.6	None✓✓	(6 x 2)	**(12)**
1.4	1.4.1	(a) W – Nucleotide✓ U – DNA✓		(2)
		(b) X – Phosphate✓/phosphate ion Y – Deoxyribose✓sugar		(2)
		(c) Z – Hydrogen✓ bond		(1)
		(d) V – Adenine✓		(1)
	1.4.2	Nucleus ✓		(1)
	1.4.3	Interphase ✓		(1) **(8)**

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 2.1.1 2✓ (1)

2.1.2 (a) X^DX^d✓✓ (2)
(b) X^dX^d✓✓ (2)

2.1.3 Since the allele is found only on the X-chromosome✓
A male only has one allele✓
that is either dominant✓ (normal)
or recessive✓ (colour-blind)
and therefore will always be colour blind✓ (if recessive allele inherited) (Any 4) (4)

2.1.4 100%✓✓ (2)
(11)

2.2 2.2.1 - Andrew has short fingers while Susan has normal fingers✓
- Andrew has straight hair while Susan has curly hair✓ (2)

2.2.2 Bh✓, bh✓ (2)
(4)

2.3 2.3.1 (a) I^BI^B✓ of I^Bi✓ (2)
(b) ii✓ (1)

2.3.2 - The baby inherited one allele for type O blood/i from each parent✓ since
- her genotype is ii✓
- Mr Phonela does not have an allele for O blood/i✓ (3)

2.3.3 Blood type can be used to exclude a particular man✓ as the parent but it cannot confirm that a particular man is the father✓
Since a large portion of the population have the same blood type✓
(Any 2) (2)

2.3.4 - Normal females have two X✓ chromosomes
- Normal males have one X and one Y✓
- The female always provides X in the egg✓
- If an egg cell is fertilized by an X bearing sperm✓ a female/girl✓is formed
- If an egg is fertilized by a Y bearing sperm✓
- a male/boy✓ is formed (Any 5)

OR

Gametes		male gamete✓	
		X	Y
female gamete✓	X	XX✓	XY✓

2 XX : 2 XY
Female ✓ Male✓ (Any 5) (5)
(13)

2.4 2.4.1 - To prevent the flowers in Population 1✓ from self-pollination✓
OR
- To ensure cross-pollination✓ between the flowers of Population 1 and Population 2✓ (2)

2.4.2 - The seeds produced did not germinate✓ (1)

2.4.3 - Type of soil✓
- Amount of water✓
- Temperature✓
- pH✓
- Exposure to sunlight✓
- Depth of sowing in soil✓

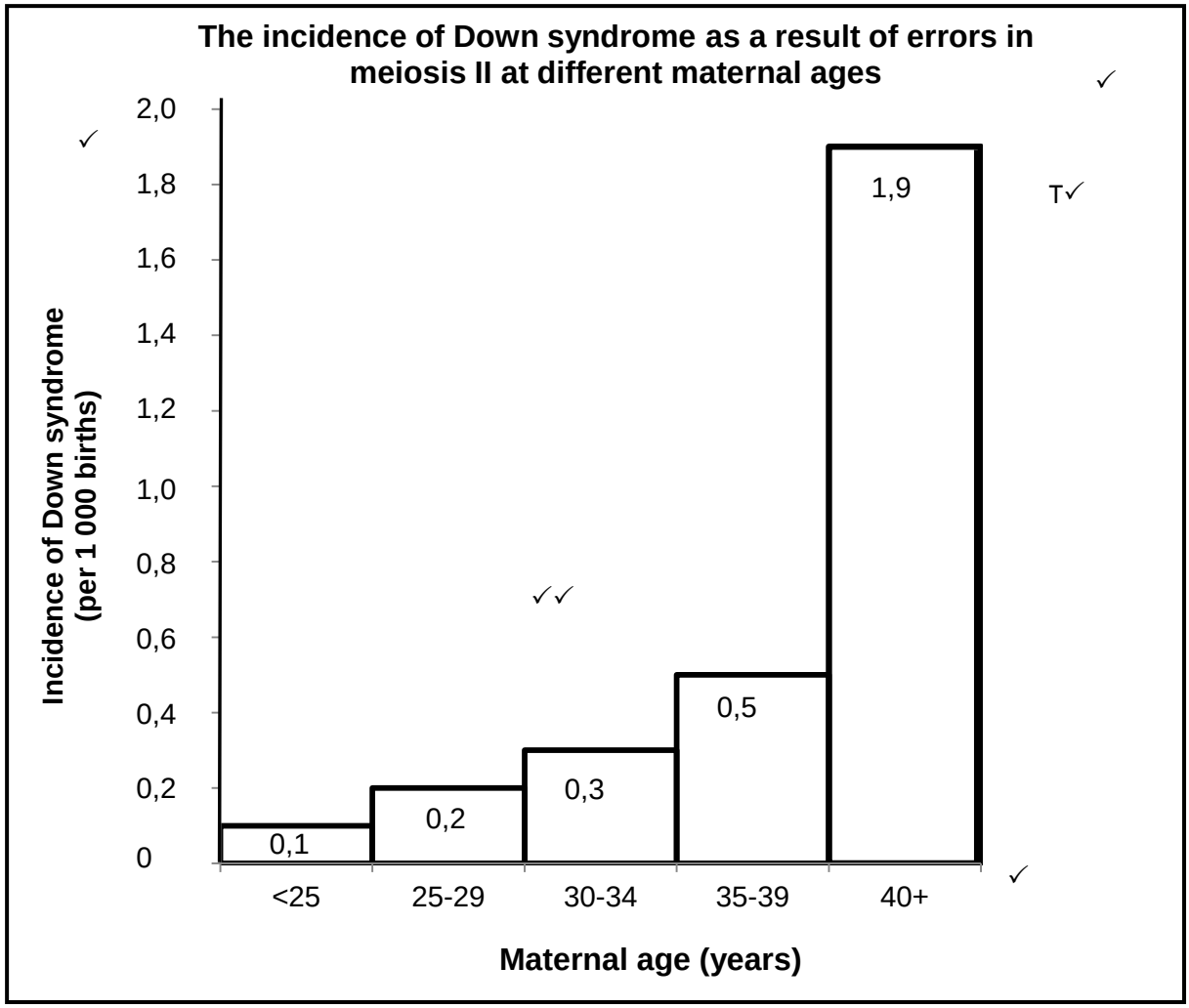
(Mark first TWO only) (Any 2) (2)

2.4.4 Repeat the investigation✓
Increase the sample size ✓/number of seeds/number of plots/ number of plants
(Mark first ONE only) (Any 1) (1)
(6)

2.5 - A population of a particular species may split into two populations✓
- because of a geographic barrier✓
- There will be no gene flow between the two separated populations✓
- Due to the difference in environmental conditions✓
- Natural selection✓will occur independently
- Making them genotypically✓ and
- Phenotypically✓different over a period of time.
- Even if the two populations mixed at a later stage, they will not be able to interbreed again✓ resulting in a new species (Any 6) **(6)**
[40]

QUESTION 3

3.1 3.1.1



Criterion	Elaboration	Mark
Type of graph	Histogram is drawn of Meiosis II	1
Caption	Including both variables: 'Incidence of Down syndrome and Maternal age'	1
X-axis	Correct label and units for X-axis: Maternal Age (years); Equal width of bars	1
Y-axis	Correct label, unit and scale for Y-axis: Incidence of Down syndrome (per 1 000 births)	1
Plotting of the bars	1 – 4 bars plotted correctly – 1 mark 5 bars correctly plotted – 2 marks	2

(6)

NOTE:
If axes are transposed:
- Marks will be lost for labelling of 'X-axis' and 'Y-axis'.

3.1.2 Non-disjunction✓ (1)

3.1.3 Meiosis I✓ (1)

3.1.4 Number of Down syndrome babies = $\frac{1,9}{7,8}$✓x 44✓
= 10,71✓/11 babies (3)
(11)

3.2 3.2.1
- DNA carries hereditary information✓
- DNA contains coded information for protein synthesis✓

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

3.2.2 ACA ✓ (1)

3.2.3 Threonine✓; Cysteine✓ (must be in correct order) (2)

3.2.4
- Both ATG and ATA✓
- Code for the same amino acid/tyrosine✓ (2)

3.2.5
- The anticodon on the tRNA matches the codon on the mRNA✓
- tRNA brings the required amino acid✓
- to the ribosome✓
- amino-acids are joined by peptide bonds✓
- to form the required protein✓ (Any 5) (5)

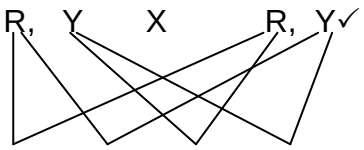
(11)

3.3 3.3.1

P_1 phenotype red-yellow X red-yellow✓
genotype RY X RY✓

Meiosis

G/gametes R, Y X R, Y✓



Fertilisation

F_1 genotype RR, RY, RY, YY✓

phenotype red apples, red-yellow apples, yellow apples✓

P_1 and F_1✓
Meiosis and fertilisation✓ (Any 6)

OR

P_1 phenotype red-yellow X red-yellow✓
genotype RY X RY✓

Meiosis

Fertilisation

Gametes	R	Y
R	RR	RY
Y	RY	YY

1 mark for correct gametes
1 mark for correct genotypes

F_1 genotype RR, RY, RY, YY✓

phenotype red apples, red-yellow apples, yellow apples✓

P_1 and F_1✓
Meiosis and fertilisation✓ (Any 6) (6)

3.3.2 50%✓/half (1)

3.3.3 A tree with red apples✓ should be crossed with a tree that produces yellow apples✓ (2)
(9)

3.4 3.4.1 *A. anamensis*✓ *and A. afarensis*✓
(Mark first TWO only) (2)

3.4.2 (4,5mya – 3mya)✓ = 1,5✓mya✓ (3)

3.4.3 The cranium increased in size✓ so it could accommodate a larger brain✓ (2)

3.4.4 Smaller teeth✓/canines in *Homo* species, can chew food that was cooked✓/made soft using fire

OR

Larger teeth/canines are not necessary ✓ because the food is softer ✓ because of cooking with fire. (2)
(9)
[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

4.1 Evolution according to Lamarck

Lamarck explained evolution using the following two 'laws':

The law of use and disuse: ✓
- As an organism uses a structure or organ more regularly✓, it becomes better developed or enlarged in that organism✓.
- If an organism does not use a structure or organ frequently✓, it becomes less developed or reduced in size and may disappear altogether in that organism✓

The inheritance of acquired characteristics: ✓
- Characteristics developed during the life of an individual✓
- (Acquired characteristics) can be passed on to their offspring. ✓ (Max 5) (5)

Evolution according to Darwin

- Organisms produce a large number of offspring✓
- There is a great deal of variation✓ amongst the offspring
- Some have favourable characteristics✓
- and some do not✓
- When there is a change in the environmental conditions✓/or
- there is competition
- Then organisms with characteristics which are more favourable survive✓
- Whilst organisms with less favourable characteristics die✓
- This is called natural selection✓
- The organisms that survive reproduce✓
- And thus pass on the favourable characteristics to their offspring✓
- The next generation will therefore have a higher proportion of individuals with the favourable characteristics✓ (Max 8) (8)

Darwin's ideas about gradualism compared to Punctuated Equilibrium

- Darwin believed that evolution takes place through an
- accumulation of small✓
- gradual changes that occur over a long period of time✓
- supported by transitional forms in fossil record✓
- Punctuated equilibrium suggested that evolution sometimes involves long periods of time where species do not change✓/very little change occurs
- This alternates with short periods of time where rapid changes occur✓
- New species are formed in a short period of time✓/relative to the long period of no/little change
- supported by the absence of transitional forms✓ (Max 4) (4)

Content: **(17)**
Synthesis: **(3)**

ASSESSING THE PRESENTATION OF THE ESSAY

Criterion	Relevance (R)	Logical sequence (L)	Comprehensive (C)
Generally	All information provided is relevant to the topic	Ideas are arranged in a logical/cause-effect sequence	All aspects required by the essay have been sufficiently addressed
In this essay	There is no irrelevant information. Only information relating to the theories of Lamarck and/or Darwin and/or Punctuated Equilibrium is/are given.	The information provided for each of the theories of Lamarck and/or Darwin and/or Punctuated Equilibrium is/are arranged logically.	At least three points included on **each** of the 3 theories: Lamarck, Darwin and Punctuated Equilibrium
Mark	1	1	1
	R	L	C

TOTAL SECTION C: 20
GRAND TOTAL: 150