basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P2

EXEMPLAR 2014

MEMORANDUM

MARKS: 150

This memorandum consists of 11 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 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. 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 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.

19. **Changes to the memorandum**
No changes must be made to the 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	A✓✓		
	1.1.2	B✓✓		
	1.1.3	A✓✓		
	1.1.4	A✓✓		
	1.1.5	D✓✓		
	1.1.6	C✓✓		
	1.1.7	D✓✓		
	1.1.8	B✓✓		
	1.1.9	B✓✓		
	1.1.10	B✓✓		
			(10 x 2)	**(20)**
1.2	1.2.1	Recessive✓		
	1.2.2	Locus✓		
	1.2.3	Phenotype✓		
	1.2.4	Autosomes✓		
	1.2.5	Genetic engineering✓/DNA manipulation/ Biotechnology/DNA recombination		
	1.2.6	Chromatids✓	(6 x 1)	**(6)**
1.3	1.3.1	Both A and B✓✓		
	1.3.2	A only✓✓		
	1.3.3	B only✓✓		
	1.3.4	A only✓✓		
	1.3.5	B only✓✓		
	1.3.6	A only✓✓		
	1.3.7	None✓✓		
	1.3.8	B only✓✓	(8 x 2)	**(16)**
1.4	1.4.1	(a) RrYy✓		(1)
		(b) rryy✓		(1)
	1.4.2	RY, Ry, rY, ry✓✓		(2)
	1.4.3	(a) Wrinkled, yellow✓ seeds		(1)
		(b) Round, yellow✓ seeds		(1)
	1.4.4	RRYY✓✓		(2)
				(8)
				[50]

QUESTION 2

2.1 2.1.1 (a) DNA✓ (1)
(b) Ribosome✓ (1)

2.1.2 (a) G✓ (1)
(b) U✓ (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 Methionine, ✓ Glycine, ✓ Arginine✓ (in the correct order) (3)
(14)

2.2 2.2.1 *H. erectus*✓ (1)

2.2.2 *A. afarensis*✓ (1)

2.2.3 (a) 3 mya – 2,4✓ mya = 0,6✓ my✓
OR
3 mya – 2,3✓ mya = 0,7✓ my✓ (3)

(b) Fossils✓ (1)

2.2.4 (a) *H. neanderthalensis*✓ (1)

(b) *H. neanderthalensis* and *H. sapiens* share a common✓ ancestor✓ (2)
OR
Both evolved✓ from *H heidelbergensis*✓ (2)
(9)

2.3 2.3.1
- The homologous chromosome pair ✓
- does not separate✓/non-disjunction
- during anaphase 1✓

(3)

2.3.2 1✓ (1)

2.3.3 Down syndrome✓ (1)

2.3.4
- During crossing over✓
- in Prophase 1✓
- segments of chromatids of homologous chromosomes✓
- are exchanged✓
- leading to each gamete having a mix of genetic material from both parents✓ (any 4)

- During Metaphase I✓/II
- each pair of homologous chromosomes✓/each chromosome
- may line up in different ways✓ on the equator of the spindle
- allowing the gametes to have different combinations of maternal and paternal chromosomes ✓ (any 3) (7)

(12)

2.4 2.4.1 Diagram 1✓ (1)

2.4.2 Diagrams 2 & 3✓✓/ 2 & 4/ 3 & 4 (2)

2.4.3 Analogous structures show that two organisms evolved independently of each other✓
Homologous structures show that two organisms have a common ancestor✓. (2)

(5)

[40]

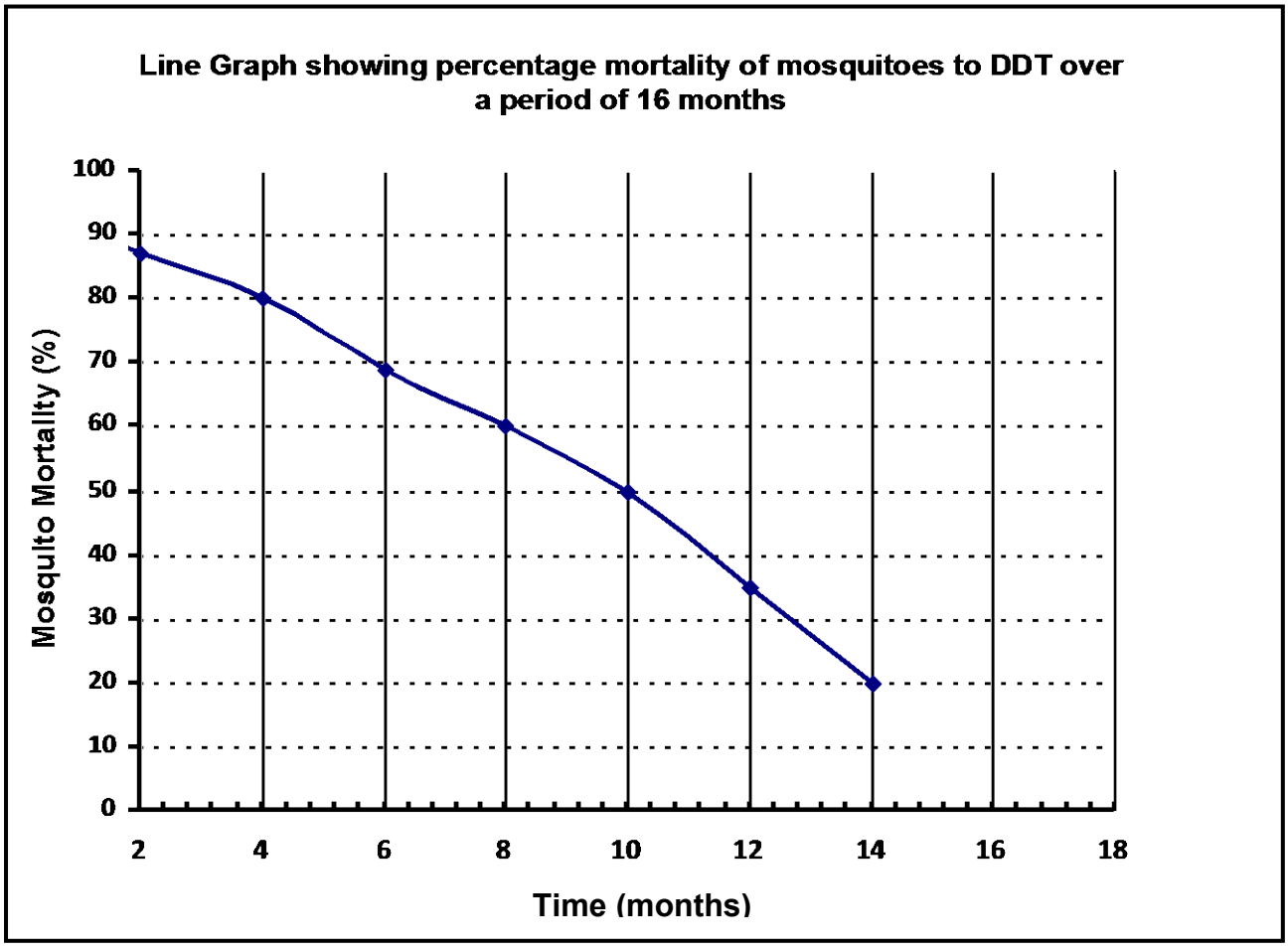
QUESTION 3

3.1 3.1.1 (a) Time ✓ (1)

(b) Mortality of mosquitoes ✓ (1)

3.1.2 Mosquito Mortality due to DDT✓/Resistance of mosquitos to DDT will decrease ✓ over time✓
OR
Mosquito Mortality due to DDT✓/Resistance of mosquitos to DDT will increase ✓ over time✓
OR
Mosquito Mortality due to DDT✓/Resistance of mosquitos to DDT will remain the same ✓ over time✓ (3)

3.1.3



NOTE:

If the wrong type of graph is drawn:
- Marks will be lost for 'correct type of graph'

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

Mark allocation for the graph

Criterion	Elaboration	Mark
Type of graph	Line graph drawn	1
Caption	Includes both variables: 'Percentage mortality of mosquitoes' and 'Time'	1
X-axis	Appropriate scale AND Correct label and units for X-axis: Time (months)	1
Y-axis	Appropriate scale AND Correct label and units for Y-axis: Mortality of mosquitoes (%)	1
Plotting of points	1–8 points plotted correctly – 1 mark All 9 points plotted correctly – 2 marks	2

(6)

3.1.4
- Same species of mosquito✓
- Identical laboratory conditions for the full period of the investigation ✓
- The same scientist must be used for the full period of the investigation ✓
- Mosquitos should not be hurt for the full period of the investigation ✓

(Mark first TWO only) (any 2) (2)

3.1.5
- Use a larger sample of mosquitoes✓
- Repeat the investigation✓
- Take many samples each time and calculate the average mortality✓

(Mark first TWO only) (any 2) (2)

3.1.6
- More mosquitoes are produced than can survive.✓
- There is genetic variation✓ amongst the mosquitoes.
- Some mosquitoes may be naturally resistant to DDT.✓
- When DDT is applied✓
- those that are resistant survive✓
- and they then reproduce,✓
- passing the allele for resistance to the offspring.✓
- Those that are not resistant, die✓
- and their alleles are lost from the population.✓
- The number of DDT-resistant mosquitoes therefore increases over the generations✓. (any 8) (8)

(23)

3.2 3.2.1 The oldest fossils of human ancestors✓ were only found in Africa✓ (2)

3.2.2
- Mitochondrial DNA is passed down from mother to child✓
- mutations✓ on the mitochondrial DNA
- were traced to an ancestral female that existed in Africa✓ (3)

(5)

3.3 3.3.1 (a) X^dX^d✓ (2)

(b) X^DY✓ (2)

3.3.2 3✓ (2)

3.3.3 **P_1** phenotype Normal female x Normal male ✓
genotype X^DX^d x X^DY ✓

Meiosis

G_1 X^D , X^d x X^D , Y ✓

Fertilisation

X^DX^D, X^DX^d, X^DY, X^dY ✓

F_1 genotype 2 normal females 1 normal male 1 colour-blind male ✓
phenotype

Parents and offspring✓/P_1 & F_1
Meiosis and fertilisation✓ (any 6)

OR

P_1/parent phenotype Grey bodied x grey bodied✓
genotype Gg x Gg ✓

Meiosis

Fertilisation

gametes	X^D	X^d
X^D	X^DX^D	X^DX^d
Y	X^DY	X^dY

1 mark for correct gametes✓
1 mark for correct genotypes✓

F_1 genotype 2 normal females 1 normal male 1 colour-blind male
phenotype

Parents and offspring✓/P_1 & F_1
Meiosis and fertilisation✓ (any 6) (6)
(12)
[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

The development of a new species

- If a population splits into two populations✓.
- There is now no gene flow between the two populations. ✓
- Since each population may be exposed to different environmental conditions✓,
- Natural selection occurs independently in each of the two populations✓
- such that the individuals of the two populations become very different from each other✓
- genotypically and phenotypically✓.
- Even if the two populations were to mix again✓,
- they will not be able to reproduce with each other✓, thus becoming different species (any 5) (5)

The development of bipedalism

- The backward position of the foramen magnum on the skull✓,
- the narrow pelvis✓
- and the less-curved spine✓
- indicates that the ape-like beings were quadripedal✓ (any 3)

- The forward position of the foramen magnum on the skull✓,
- the wider pelvis✓
- and the curved spine✓
- indicates that modern humans are bipedal✓ (any 3) (6)

Change in the diet from raw food to cooked food

- The large teeth, especially the canines✓
- as well as the large and long jaws✓
- which makes the skull prognathous✓
- as well as cranial/brow ridges associated with large muscles that operate the jaws✓
- indicate that the ape-like beings ate raw food that required a great amount of processing✓/tearing, biting and chewing. (any 3)

- The smaller teeth, including the canines✓
- as well as the smaller jaw size✓
- which makes the skull less prognathous✓
- as well as the absence of cranial/brow ridges due to the presence of smaller muscles for chewing✓
- indicate that modern humans rely on a diet of cooked food that does not require the same amount of processing✓/tearing, biting and chewing. (any 3) (6)

Content: (17)
Synthesis: (3)
(20)

ASSESSING THE PRESENTATION OF THE ESSAY

Relevance	Logical sequence	Comprehension
Only information regarding development of a new species, the development of bipedalism and change in diet is given (no irrelevant information).	Generally, the development of a new species, the development of bipedalism and change in diet are explained logically.	All three aspects of the question are described correctly.

TOTAL SECTION C: 20
GRAND TOTAL: 150