



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✓ (b) rryy✓		(1) (1)
	1.4.2	RY, Ry, rY, ry✓✓		(2)
	1.4.3	(a) Wrinkled, yellow✓ seeds (b) Round, yellow✓ seeds		(1) (1)
	1.4.4	RRYY✓✓		(2)
				(8)
				[50]

2.3	2.3.1	<ul style="list-style-type: none"> – 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	<ul style="list-style-type: none"> – 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	<p>Analogous structures show that two organisms evolved independently of each other ✓</p> <p>Homologous structures show that two organisms have a common ancestor ✓.</p>	(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 ✓

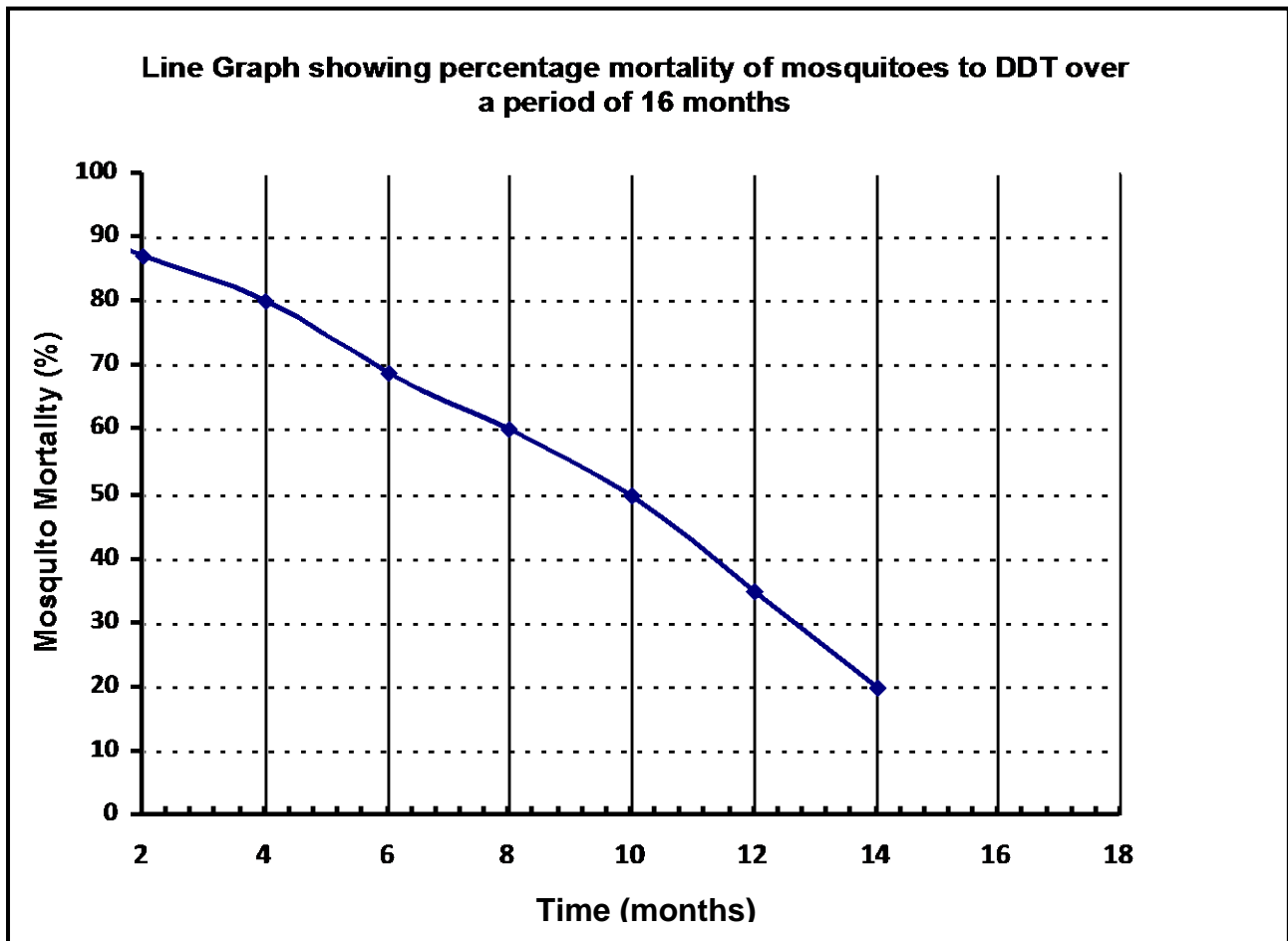
OR

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 **P₁** phenotype Normal female X^DX^d x Normal male X^DY ✓
genotype x ✓

Meiosis

G₁ X^D, X^d x X^D, Y ✓

Fertilisation

$X^DX^D, X^DX^d, X^DY, X^dY$ ✓

F₁ genotype 2 normal females 1 normal male 1 colour-blind male ✓
phenotype

Parents and offspring✓/P₁ & F₁

Meiosis and fertilisation✓

(any 6)

OR

P₁/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✓

F₁ genotype 2 normal females 1 normal male 1 colour-blind male
phenotype

Parents and offspring✓/P₁ & F₁

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