basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P1

FEBRUARY/MARCH 2014

MEMORANDUM

MARKS: 150

This memorandum consists of 12 pages.

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PRINCIPLES RELATED TO MARKING LIFE SCIENCES 2014

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-recognised 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 recognisable 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 who in turn will consult with the national internal moderator (and the external moderators where necessary)

20. Only memoranda bearing the signatures of the national internal moderator and the UMALUSI moderators and distributed by the National Department of Education via the provinces must be used.

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SECTION A

QUESTION 1

1.1	1.1.1	A✓✓		
	1.1.2	C✓✓		
	1.1.3	C✓✓		
	1.1.4	A✓✓		
	1.1.5	C✓✓		
	1.1.6	C✓✓		
	1.1.7	D✓✓		
	1.1.8	B✓✓		
	1.1.9	C✓✓		
	1.1.10	B✓✓	(10 x 2)	**(20)**
1.2	1.2.1	Sickle-cell anaemia✓		
	1.2.2	Genotype✓		
	1.2.3	Extinction✓		
	1.2.4	Genome✓		
	1.2.5	Bipedal✓/Bipedalism		
	1.2.6	Diploid✓		
	1.2.7	Chiasma✓/Chiasmata		
	1.2.8	Karyogram✓/Karyotype		**(8)**
1.3	1.3.1	Both A and B✓✓		
	1.3.2	None✓✓		
	1.3.3	A only ✓✓		
	1.3.4	B only✓✓		
	1.3.5	A only✓✓		
	1.3.6	A only✓✓		
	1.3.7	None✓✓		
	1.3.8	B only ✓✓	(8 x 2)	**(16)**
1.4	1.4.1	iii✓✓		(2)
	1.4.2	i✓✓		(2)
	1.4.3	50%✓✓		(2)
				(6)
				[50]

TOTAL SECTION A: 50

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SECTION B

QUESTION 2

2.1	2.1.1	Translation✓	(1)
	2.1.2	GGA✓ GTG✓	(2)
	2.1.3	(a) Peptide✓ bond (b) Ribosome✓	(1) (1)
	2.1.4	(a) 7- Glutamate✓ 9- Proline✓ (b) 5 - Histidine✓	(2) (1) **(8)**
2.2	2.2.1	It has thymine✓	(1)
	2.2.2	Frame-shift ✓mutation	(1)
	2.2.3	- The mutated sequence will have 1 amino acid short ✓ - The amino acid sequence changes from that point onwards✓ - resulting in a different protein being formed✓/CFTR will not be formed any	(2) **(4)**

2.3 2.3.1

P_1/parent phenotype: tortoise-shell female x orange male✓

genotype: X^BX^O x X^OY ✓

Meiosis

G/gametes X^B , X^O x X^O, Y✓

Fertilisation

F_1/offspring genotype X^BX^O, X^BY, X^OX^O & X^O Y✓

phenotype 1 tortoise-shell female, 1 black male,
1 orange female and 1 orange male✓✓
(1 mark for gender and 1 mark for fur colour with correct proportion)

any (7)

OR

P_1/parent phenotype tortoise-shell female x orange male✓

genotype X^BX^O x X^OY ✓

Meiosis

Fertilisation

gametes	X^B	X^O
X^O	X^BX^O	X^OX^O
Y	X^BY	X^O Y

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

F_1/offspring
phenotype: 1 tortoise-shell female, 1 black male,
1 orange female and 1 orange male✓✓
(1 mark for gender and 1 mark for fur colour with correct proportion)

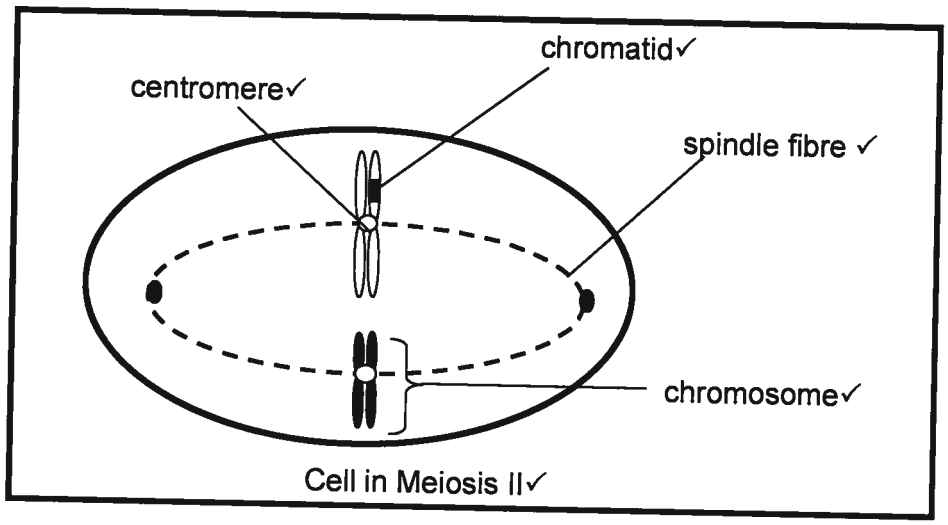
any (7)

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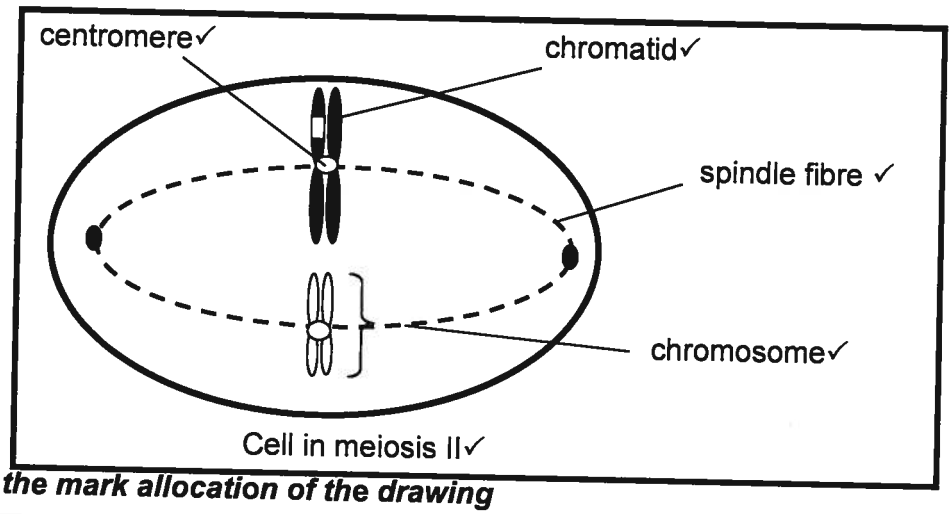
2.3.2 The allele for the trait is carried on the X-chromosome✓only/ Y-chromosome does not carry the allele for the trait
The trait only shows when it is in the heterozygous✓condition (2)

2.3.3 - Both alleles are dominant✓/co-dominant
- Both colours are equally expressed✓ in the phenotype (2)
(11)

2.4



OR



Checklist for the mark allocation of the drawing

Caption	1
2 chromosomes shown	1
Alignment of chromosomes at the equator shown	1
Correct appearance of chromosomes	1
Any 3 **correct** labels: - Spindle fibre - Chromosome - Chromatid - Centromere	3

(7)
[30]

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QUESTION 3

3.1 3.1.1 - Effective✓ harvesting ✓of food source
- Competition for food✓ is reduced✓

(Mark first ONE only) Any 1x2 (2)

3.1.2
- There was variation in a population of cichlid fish✓
- The population occupied the same area✓ /No geographical barrier
- ***They may have separated into three groups/different niches due to differences in feeding habits✓**
- Each group underwent natural selection independently✓ and each group in the lake developed differently✓
- Genotypically✓ and phenotypically✓
- Gene flow✓/reproduction between the different populations did not occur
- The differences that developed among the different populations prevented them from inter-breeding✓
- The 3 groups became new species✓

Max 5 + 1*(compulsory mark) (6) **(8)**

3.2 3.2.1 *Australopithecus afarensis* is the common ancestor in both models✓
Homo heidelbergensis evolved from *Homo ergaster*✓
Homo heidelbergensis is a common ancestor for *Homo sapiens* and *Homo neanderthalensis* ✓
(Mark first TWO only) any (2)

3.2.2

Model 1	Model 2
Homo habilis evolved directly from *Australopithecus afarensis*✓	*Homo habilis* evolved from *Australopithecus africanus* ✓
Homo erectus evolved directly from *Australopithecus afarensis*✓	*Homo erectus* evolved from *Homo ergaster* ✓
Homo ergaster evolved directly from *Australopithecus afarensis*✓	*Homo ergaster* evolved from *Homo habilis* ✓

any 2x2 (4)

NOTE: Table not compulsory
(Mark first TWO only)

3.2.3 *Australopithecus africanus* and *Homo habilis*✓ (1)

3.2.4

Australopithecus	*Homo*
1 Prominent brow ridge present✓	1 No prominent brow ridge✓
2 Prognathous face✓/ protruding jaws	2 Non- prognathus✓/ less protruding jaws
3 Less rounded skull✓	3 More rounded skull✓
4 Teeth arranged in a less curved way✓/less rounded upper jaw	4 Teeth arranged on a gentle(round) curve✓/more rounded upper jaw
5 Larger upper jaw✓	5 Smaller upper jaw✓
6 Foramen magnum located in a backward position✓	6 Foramen magnum located in a forward position✓
7 Sloping face✓	7 Flat face✓
8 Proportionally smaller cranium✓	8 Proportionally larger cranium✓

Any 2x2 (+ 1 for table) (5)

(Mark first TWO only) **(12)**

3.3 3.3.1 (a) Growth of bacteria✓/the diameter of the area with no bacterial growth (1)

(b) Same strain of bacteria ✓
Same amount of bacteria in all the petri dishes✓
Same amount of agar medium✓
ALL measurements of the diameter should be done by the same person✓/instrument any (3)

(Mark first THREE only)

3.3.2 To increase the reliability of the results✓ (1)

3.3.3 To verify that any difference in bacterial growth is due to the action of Novamycin✓/Acts as a control (1)

3.3.4 (a) An increase in the concentration of Novamycin✓ will increase ✓ bacterial growth ✓

OR

An increase in the concentration of Novamycin✓ will decrease✓ bacterial growth✓

OR

An increase in the concentration of Novamycin✓ will have no effect✓ on bacterial growth✓

any(1x3) (3)

(b) Amount✓ /mass of Novamycin (1)

(Mark first ONE only) **(10)**

[30]

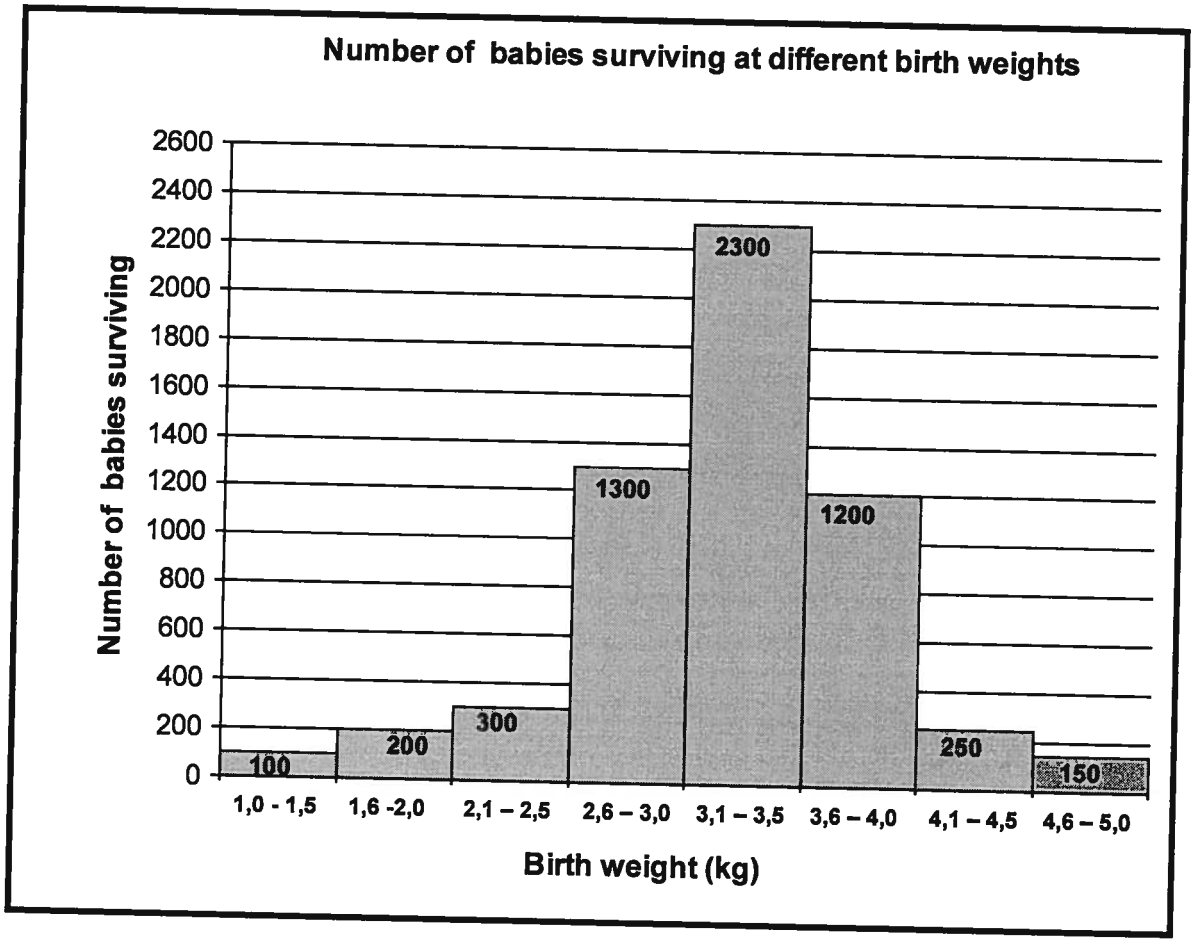
TOTAL SECTION B: 60

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SECTION C

QUESTION 4

4.1 4.1.1



Checklist for the mark allocation of the graph

Correct type of graph (histogram)	1
Title of graph	1
Correct label for X-axis (including unit) and Y-axis	1
Appropriate scale for X-axis and width of the bars	1
Appropriate scale for Y-axis	1
Plotting of bars	1 – 1 to 7 bars plotted correctly 2 – all 8 bars plotted correctly

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

(7)

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4.1.2 Polygenic ✓ inheritance (1)

4.1.3 Polygenic inheritance: Genes are found at different/multiple loci✓
One gene inheritance: Gene found at one locus✓
OR
Polygenic inheritance: Has a range of intermediate phenotypes✓ for the trait/continuous variation
One gene inheritance: Has distinct phenotypes✓ for a trait/ discontinuous variation (2)
(10)

4.2 4.2.1 Scientists compared✓ the DNA profile obtained in the test with the unique DNA✓ profile of different organisms (2)

4.2.2 The cost of the kudu meat✓ might be high
The availability of the kudu meat✓ might be scarce at the time
(Mark first TWO only) any (2)

4.2.3 Some religions/ cultures who do not use certain type of meat✓ can avoid these if it is properly labelled✓/
People who have intolerance/ allergic to some other nutrients mixed in meat✓ can avoid these if it is properly labelled✓ (2)

4.2.4 The cost of DNA testing is expensive✓ (1)

4.2.5 Human error✓could have occurred when analysing the results (1)

4.2.6 Paternity testing✓/trace genetic lineages
Determining genetic disorders✓
Identifying missing individuals✓/ dead people
(Mark first TWO only) any (2)
(10)

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4.3 **Possible Answer**

- Each chromosome shortens and becomes visible✓
- as two chromatids✓
- joined by a centromere✓
- Homologous chromosomes come to lie next to each other✓
- Chromatids from each homologous chromosome overlap✓/crossing over occurs
- The point of overlap is called the chiasma✓
- Genetic material is exchanged✓ between the homologous chromosomes
- The chromosomes line up along the equator✓
- in homologous pairs✓
- attached to the spindle fibres✓
- When the spindle fibres shorten✓/contract
- *** All 4 chromosomes are pulled to one pole**✓ due to non-disjunction
- Resulting in two cells✓
- *** one with 4 chromosomes✓,**
- *** and one with no chromosomes✓.**
- The cell with 4 chromosomes undergoes meiosis 2✓
- The 4 chromosomes line up at the equator✓
- in a single row✓
- When the spindle fibres shorten✓/contract
- the centromeres split✓
- and chromatids✓/daughter chromosomes
- are pulled to the opposite poles of the cell✓
- Two cells result✓
- *** Each with a nucleus containing 4 chromosomes✓**
- *** Resulting in diploid gametes✓**

Any 4 compulsory* points + any other 13

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

ASSESSING THE PRESENTATION OF THE ESSAY

Description	Marks
All information given is relevant to chromosomal changes only and non-disjunction	1
The events of meiosis are presented in the sequence in which they occur	1
Provided information on both the normal and abnormal events in meiosis	1

TOTAL SECTION C: 40
GRAND TOTAL: 150

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