basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P1

VERSION 1 (NEW CONTENT) FOR FULL-TIME CANDIDATES

NOVEMBER 2012

FINAL MEMORANDUM

MARKS: 150

This memorandum consists of 12 pages.

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PRINCIPLES RELATED TO MARKING LIFE SCIENCES 2012

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, drawings, 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	D✓✓		
	1.1.2	C✓✓		
	1.1.3	B ✓✓		
	1.1.4	C✓✓		
	1.1.5	C✓✓		
	1.1.6	C✓✓		
	1.1.7	C✓✓		
	1.1.8	D✓✓		
	1.1.9	B✓✓		
	1.1.10	C✓✓	(10 x 2)	**(20)**
1.2	1.2.1	Sympatric✓speciation		
	1.2.2	Non-disjunction✓/(non-separation)		
	1.2.3	Homozygous✓		
	1.2.4	Polyploidy✓		
	1.2.5	Homologous✓structure		
	1.2.6	Nucleotides✓		
	1.2.7	Cytokinesis✓		
	1.2.8	Replication✓		**(8)**
1.3	1.3.1	Both A and B✓✓		
	1.3.2	A only✓✓		
	1.3.3	Both A and B✓✓		
	1.3.4	Both A and B✓✓		
	1.3.5	B only✓✓		
	1.3.6	Both A and B✓✓		
	1.3.7	B only✓✓		
	1.3.8	None✓✓	(8 x 2)	**(16)**
1.4	1.4.1	C- deoxyribose✓/(sugar) D- phosphate✓		(2)
	1.4.2	(weak) hydrogen bond✓		(1)
	1.4.3	It is double✓stranded/base pairs are present/(ladder -like) **(Mark first ONE only)**		(1)
	1.4.4	nucleus✓✓/chromosomes/chromatin/mitochondrion		(2) **(6)**

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 2.1.1 X - chiasma✓
Z - centromere✓ (2)

2.1.2 The chromosomes are of the same structure ✓/ size/ shape/ length
Crossing-over is taking place✓ any (1)
(Mark first ONE only)

2.1.3 It increases genetic variation✓/produces recombinant gametes (1)
(Mark first ONE only)

2.1.4 Random arrangement of chromosomes✓ /independent assortment (1)
(Mark first ONE only)

2.1.5 40✓/20 pairs (1)
(6)

2.2 2.2.1 (a) 21✓
(b) 6 ✓
(c) 7 ✓ (3)

2.2.2 ACU✓ CCU✓ GAG✓ (sequence must be correct) (3)

2.2.3 threonine✓ proline✓glutamate✓ (sequence must be correct) (3)

2.2.4 (a) valine✓
(b) point✓mutation (2)

2.2.5 Sickle-shaped red blood cells would carry less O_2✓ to cells therefore less cellular respiration✓leading to less energy being generated✓/tiredness/lethargy/fatigue

OR

Sickle-shaped red blood corpuscles blocks small blood vessels✓which leads to reduced blood supply✓/reduced O_2 therefore less cellular respiration leading to less energy being generated✓/tiredness/ fatigue/lethargy/damage to organs

OR

May prevent malaria✓ because the parasite✓ does not survive if it invades sickle- shaped✓ red blood corpuscles (3)
(14)

2.3 2.3.1 White✓ (1)

2.3.2 Genetic cross 2✓ (1)
(Mark first ONE only)

2.3.3 **Greater proportion of plants had white**✓✓ corn/
3 white : 1 yellow

OR

Yellow appeared in offspring yet not in parents✓ showing that yellow is recessive✓/white is dominant (2)

2.3.4 **P**$_1$/parent phenotype white maize x white maize✓
genotype Gg x Gg✓

Meiosis

G/gametes G, g x G, g✓

Fertilisation

F$_1$/offspring genotype GG, Gg, Gg & gg✓
phenotype 3 white and 1 yellow maize✓

Generations: Parents/P$_1$ and offspring /F$_1$✓
Processes: Meiosis and fertilisation✓ any (6)

OR

P$_1$/parent phenotype white maize x white maize✓
genotype Gg x Gg ✓

Meiosis

Fertilisation

gametes	G	g
G	GG	Gg
g	Gg	gg

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

F$_1$/offspring
phenotype 3 white and 1 yellow maize✓

Generations: Parents/P$_1$ and offspring /F$_1$✓
Processes: Meiosis and fertilisation✓

any (6)
(10)
[30]

QUESTION 3

3.1	3.1.1	4✓	(1)
	3.1.2	The allele for the trait is carried on the X-chromosome✓/ Y chromosome does not carry the allele for the trait. Male only has one X chromosome✓ A male needs only one recessive allele✓ to be haemophiliac Whereas for a female to be haemophiliac **both alleles must be recessive**✓ any	(3)
	3.1.3	(a) $X^H X^h$✓✓	(2)
		(b) $X^h Y$✓✓	(2)
	3.1.4	25%✓✓ / ¼ **OR** 50% ✓✓/ ½	(2)
	3.1.5	To determine if the wife is a carrier✓ To determine the chances of having a child with haemophilia✓ Help them evaluate whether they would cope with such a child✓ Help them make an informed decision about whether to have children ✓ any **(Mark first TWO only)**	(2) **(12)**
3.2	3.2.1	To increase the reliability✓ of the results	(1)
	3.2.2	1:1✓/(90:90)	(1)
	3.2.3	In a DNA molecule, thymine always pairs with adenine✓/thymine and adenine are complementary bases	(1)

3.2.4

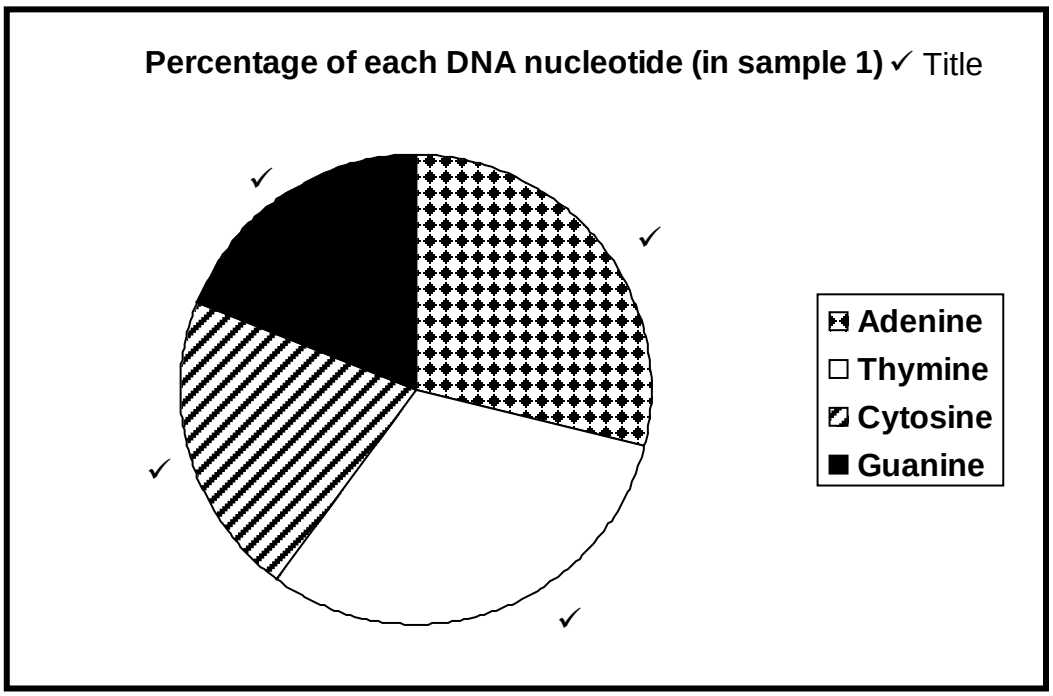
$\frac{29}{100} \times 360^{o} = 104,4^{o}/104^{o}$

$\frac{31}{100} \times 360^{o} = 111,6^{o}/112^{o}$

$\frac{21}{100} \times 360^{o} = 75,6^{o}/76^{o}$

$\frac{19}{100} \times 360^{o} = 68,4^{o}/68^{o}$

✓✓



Mark allocation of the graph

Calculations/working to determine the correct proportions	2 marks: All four calculations correct 1 mark: 1 to 3 calculations correct
Correct type of graph (pie chart)	1
Title of graph	1
Proportions accurate for each sector/slice labelled /key	4 marks: All four sectors correct (use transparency template) (1 x mark/ sector)

(8)
(11)

Note:
If the wrong type of graph is drawn: marks will be lost for 'correct type of graph' as well as for 'drawing of sectors in correct proportion'.

3.3 3.3.1 (a) New equipment✓/research is expensive
Labour intensive✓
Many clinical trials✓must be done/long time to produce a safe product any (2)
(Mark first TWO only)

(b) May easily pollinate/mate with non-GM crops/animals✓
They might out-compete✓/destroy the naturally occurring organisms
Reduces gene pool✓/variation
May not be a suitable food source anymore✓ for other organisms
GMO may be poorly adapted to environment✓ any (2)
(Mark first TWO only)

3.3.2 Interfering with nature✓
Immoral/ we cannot play God✓
Violation of natural organism's intrinsic value✓
Unsure of long term effects✓
Potential health risk✓
Domination of world food production by only a few companies✓
(Mark first THREE only) any (3)
(7)
[30]

TOTAL SECTION B: 60

SECTION C

QUESTION 4

4.1 4.1.1 Carefully analyse✓ and verify✓ the evidence/findings before releasing the results (2)

4.1.2 To inform people of their findings✓ so that they can critique✓/verify their findings/use it for future research/acknowledge ownership of the findings (2)

4.1.3 A transitional form has characteristics✓ of both ✓the australopithecines and humans (2)

4.1.4 The brain was small✓ like other Australopithecine species but the re-organisation/configuration of the brain✓/an expansion behind and above the eyes was more like modern humans

OR

Brain/hand/foot have characteristics✓ of both✓ modern and early pre-human
(Mark first ONE only) (2)

4.1.5 Olfactory brain centres reduced✓/reduced sense of smell
Eyes in front✓
Binocular vision✓ /stereoscopic vision
Eyes with cones✓/colour vision
Freely rotating arms✓
Elbow joints allowing rotation of forearm✓
Flat nails instead of claws✓/bare, sensitive finger tips
Opposable thumbs✓
Upright posture✓/bipedal
Sexual dimorphism✓
Long upper arms✓
Two teats✓
5 Fingers✓
Fewer offspring✓ any (6)
(Mark first SIX only) **(14)**

4.2 4.2.1 *Palaeomastodon sp.* ✓ (1)

4.2.2 *Elephas* sp.✓
Loxondonta sp.✓ (2)
(Mark first TWO only)

4.2.3 *Primelaphus* sp.✓ (1)

4.2.4 (a) Miocene✓
(b) Pleistocene✓ (2)
(6)

4.3

Natural selection e.g. Finches*****✓/or any other example

- Organisms of a particular species shows a great deal of variation✓
- Some individuals may have characteristics /any example that are favourable✓ /some individuals may be adapted to the environment
- Others may have characteristics/any example that are unfavourable✓
- Selective pressure by the environment✓ due to competition✓/changing environmental conditions
- Organisms with favourable characteristics survive✓ and reproduce✓
- to pass favourable characteristics to their offspring✓
- while organisms with unfavourable characteristics will die out✓
- Over time the whole population will have this favourable trait✓
- Over time these organisms might develop genotypically and phenotypically independently✓
- into different species✓ which cannot interbreed ****Compulsory mark***

Max 7 + 1 for example* (8)

Artificial selection e.g. Production of improved fruit/ meat production*****✓

- Organisms of a particular species/any example show a great deal of variation✓
- Humans✓ select organisms
- with a particular desirable characteristic✓
- and interbreed✓them
- with other organisms that also✓ have the same desirable characteristic
- to improve this characteristic further✓ in the offspring
- They may also choose organisms with different✓ desirable characteristics
- to get offspring with a combination✓ of these desirable characteristics

****Compulsory mark***

Max 4 + 1 for example*

Differences between Natural and Artificial selection (5)

Natural selection	Artificial selection
Selective pressure by the environment✓	Humans select the desirable characteristic✓
Selection is in response to suitability to the environment✓	Selection is in response to satisfying human needs✓
Organisms can survive on their own✓ in the environment (since they were selected on the basis of their suitability to the environment)	Organisms may often not survive on their own✓ in the environment (since they were selected on the basis of human needs and not on suitability to the environment)
No human effort/cost involved✓	Could be labour intensive✓/expensive

any 2x2 (4)
Content (17)
Synthesis (3)
(20)

ASSESSING THE PRESENTATION OF THE ESSAY

Marks	Description
3	Well structured- demonstrate insight and understanding of question
2	Minor gaps or irrelevant information in the logic and flow of the answers
1	Attempted but with significant gaps and irrelevant information in the logic and flow of the answers
0	Not attempted/nothing written other than question number/no correct information

TOTAL SECTION C: 40
GRAND TOTAL: 150

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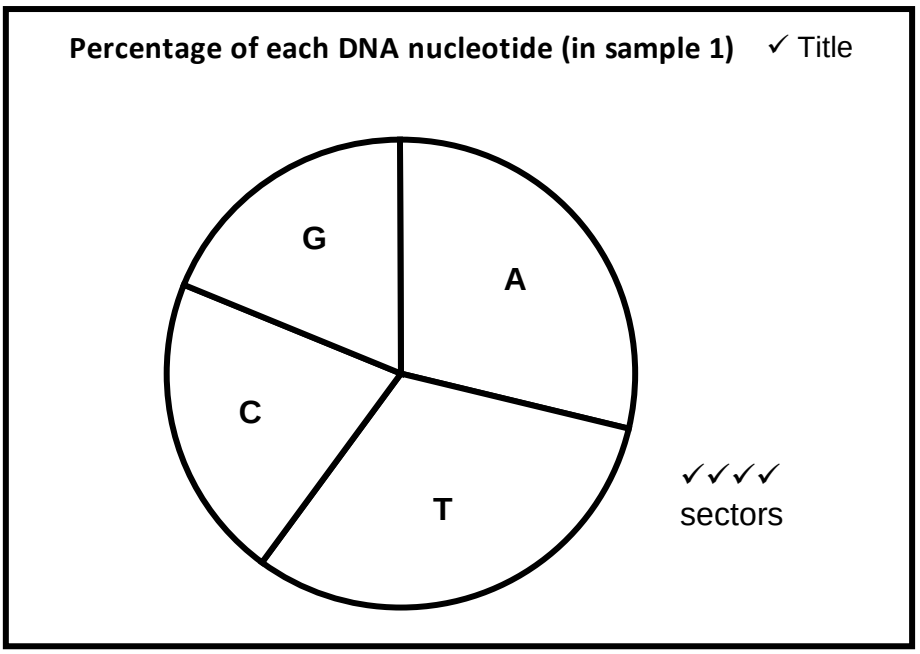

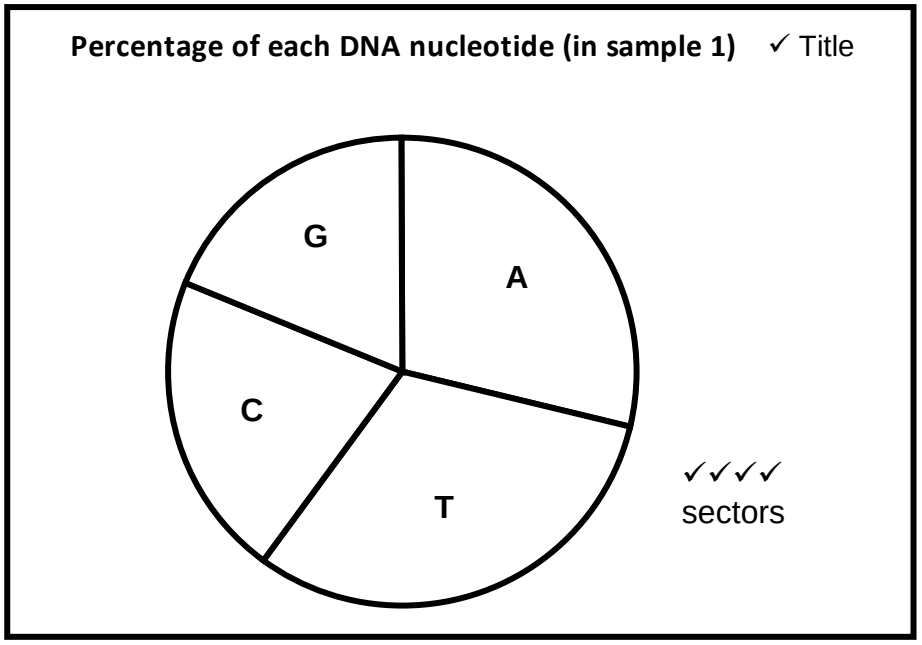

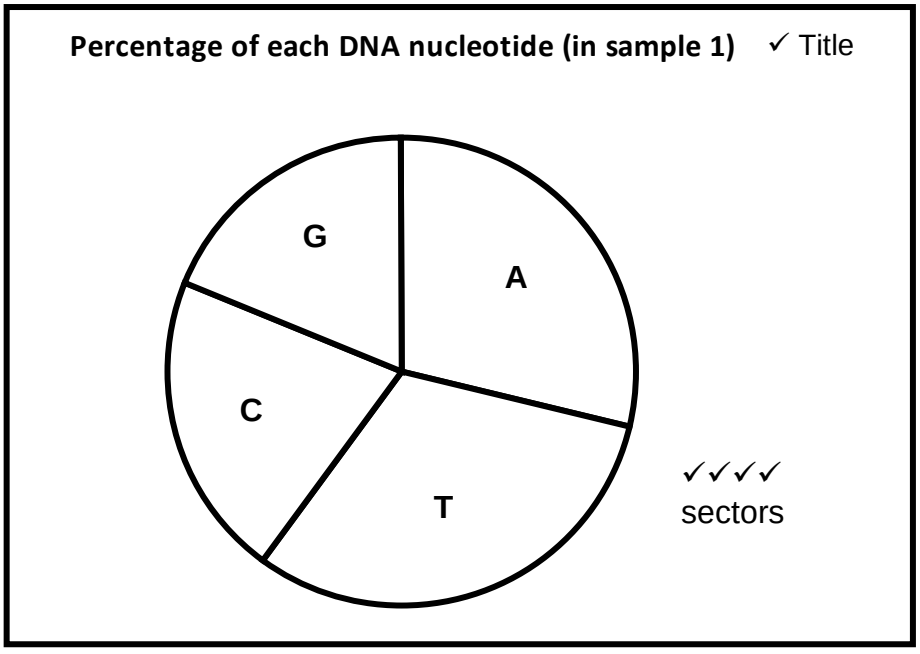

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