GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATION

2014

MEMORANDUM

SUBJECT:	**LIFE SCIENCES P2 (10832)**

GAUTENG DEPARTMENT OF EDUCATION
PREPARATORY EXAMINATION

LIFE SCIENCES
(Second Paper)

MEMORANDUM

PRINCIPLES RELATED TO MARKING LIFE SCIENCES 2014

1. **If more information than marks allocated is given**
   Stop marking when maximum marks are 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 parts.

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 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 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 memo discussion.

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 approved memoranda without consulting the Subject Advisor, who in turn will consult with the Provincial Internal Moderator.

SECTION A
QUESTION 1

1.1	1.1.1	C✓✓		
	1.1.2	C✓✓		
	1.1.3	D✓✓		
	1.1.4	A✓✓		
	1.1.5	D✓✓		
	1.1.6	B✓✓		
	1.1.7	D✓✓		
	1.1.8	B✓✓	(8 x 2)	**(16)**
1.2	1.2.1	DNA fingerprinting✓/DNA profiling		
	1.2.2	Centromere ✓		
	1.2.3	Centriole ✓/centrosome		
	1.2.4	Ribose ✓		
	1.2.5	Replication✓		
	1.2.6	Punctuated equilibrium✓	(6 x 1)	**(6)**
1.3	1.3.1	Both A and B ✓✓		
	1.3.2	A only ✓✓		
	1.3.3	A only ✓✓		
	1.3.4	None ✓✓		
	1.3.5	A only ✓✓		
	1.3.6	Both A and B ✓✓		
	1.3.7	B only ✓✓	(7 x 2)	**(14)**

1.4	1.4.1	a) Discontinuous ✓ variation	(1)
		b) Group of organisms with similar characteristics ✓ which are able to interbreed ✓ to produce fertile offspring✓ Any 2	(2)
		c) *Equus grevyi* ✓	(1)
	1.4.2	a) Phenotype ✓	(1)
		b) Gene mutation: change in the structure of a gene✓ Chromosomal aberration: change in the number of chromosomes✓/in the structure of a chromosome/arrangement of genes in a chromosome.	(2) **(7)**
1.5	1.5.1	Palate – A – rounded(parabolic)✓ , B - rectangular✓ Teeth(Dentition) – A – small canines✓ , B – large canines✓	(4)
	1.5.2	Organism A✓	(1)
	1.5.3	In organism A, the position of the foramen magnum✓ suggest that the head is directly on top of the spine✓ / in a forward position at the bottom of the skull	(2) **(7)**
		TOTAL SECTION A:	**50**

SECTION B

QUESTION 2

2.1	2.1.1	Ovary ✓	(1)
	2.1.2	Prophase I✓	(1)
	2.1.3	Crossing over✓	(1)
	2.1.4	Introduces genetic variation✓	(1)
	2.1.5	Male has XY chromosome forming gametes with either X and Y chromosomes✓ Female has XX chromosome forming gametes with X chromosome only✓ On fertilisation, the offspring formed have genotype XX or XY in a 1:1 ratio / 50% : 50% ratio✓	(3)
	2.1.6	Women have two X chromosomes ✓ and because the mutation is recessive, it must appear on both ✓ chromosomes for the disease to become visible✓. In males there is only one X ✓ chromosome and therefore shows the disease when one mutated allele is present✓. (Any 3)	(3) **(10)**
2.2	2.2.1	Translation✓	(1)
	2.2.2	Transcription✓	(1)
	2.2.3	1: Glycine ✓ 4: Proline ✓	(1) (1) **(4)**
2.3	2.3.1	B✓	(1)
	2.3.2	20 – 5 = 15✓ 15/5 x 100✓ = 300✓%	(3)
	2.3.3	10✓x-fold increase over control	(1) **(5)**

2.4	2.4.1	DNA✓		(1)
	2.4.2	Double✓ stranded molecule Presence of nitrogenous base thymine✓	(2x1)	(2)
	2.4.3	X: Hydrogen bond✓ 1: cytosine✓		(2)
	2.4.4	- Double helix unwinds✓ - weak hydrogen bonds between nitrogenous bases break✓ - two DNA strands unzip/ separate✓ - each original DNA strand serves as a template✓ to form a new strand - by attaching to free nucleotides✓ from the nucleoplasm - to form complementary strands✓ (A to T, C to G) - each DNA molecule now consists of one original strand and one new strand✓ - the result is two genetically identical✓ DNA molecules - the entire process is controlled by enzymes✓	(Any 6)	(6)
	2.4.5	Watson & Crick indicated that it was a double helix ✓ with complementary base pairs ✓		(2) **(13)**
2.5	2.5.1	(i) P_1 Phenotype: Tall, red fruit colour and short, yellow fruit colour✓ P_1 Genotype: TTRR and ttrr✓		(2)
		(ii) F_1 Genotype: TtRr✓ F_1 Phenotype: Tall, red fruit colour✓		(2)
	2.5.2	$\frac{1}{16}$ / 6%✓✓		(2)
	2.5.3	The two alleles controlling a given characteristic ✓, separate and go to different gametes during meiosis✓.		(2) **(8)** **[40]**

QUESTION 3

3.1 3.1.1 1975 ✓ (1)

3.1.2 From 1977 to 1978 it increased ✓ and then from 1978 to 1980 there was a decrease✓ (2)

3.1.3 Amount of rainfall✓ (1)

3.1.4
- There was variation✓ in the beak-size of the finch population
- Some finches had small beaks and others had large beaks ✓
- During the seasons of 1977 – 1980 low rainfall/ drought✓
- Abundance of large seeds/ lack of small seeds✓
- Finches with small beaks eliminated✓
- Finches with large beaks survived✓ on the larger seeds
- Characteristic of large beak was passed onto offspring✓
- Increasing the proportion of large beaks in future generations✓

(any 6) (6)
(10)

3.2 3.2.1 Breeding season✓ is different ✓ (2)

3.2.2
- Courtship behaviour ✓
- Adaptation to different pollinators ✓
- Infertile offspring / hybrid sterility✓

(Mark FIRST TWO only) (2x1) (2)
(4)

3.3 3.3.1 There was no effect✓ on TB bacteria✓ after antibiotic treatment ✓

OR

Population size of TB bacteria✓ decreased✓ after antibiotic treatment✓

OR

Population size of TB bacteria✓ increased✓ after antibiotic treatment✓ (3)

3.3.2 (a) Administration of antibiotic ✓ (1)
(b) Population size of TB bacteria✓ (1)

3.3.3 B✓ (1)

3.3.4 All the non-resistant bacteria/ bacteria A are killed off/ destroyed✓ And population size of bacteria B increased✓ (2)

3.3.5 Natural selection✓ (1)

3.3.6 Resistant bacteria ✓ will be unaffected ✓ by antibiotic and increase ✓ infection. (2)

3.3.7 Bacteria taken from human ✓ with normal ✓temperature at 37,5º C (2)

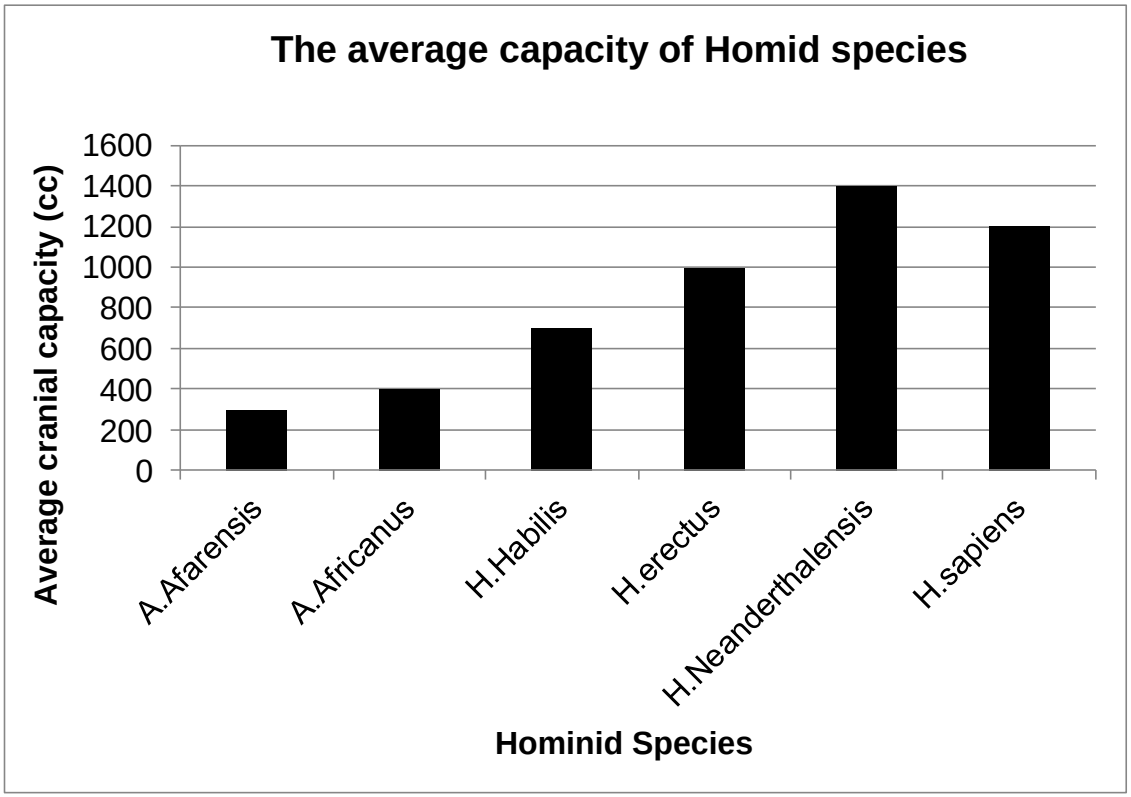
3.3.8
- Ensure petri dishes are sterilized✓ before investigation
- Temperature must be kept at 37,5º C /human body temperature✓
- Use the same antibiotic✓
- Use the same concentration of antibiotic✓ (any two) (2)

(15)

3.4.1 *Ardipithecus* ✓
Australopithecus✓
Homo ✓ (3)

3.4.2 *Homo heidelbergensis*✓ (1)

3.4.3



Correct type of graph	1
Caption for graph	1
Correct label for X-axis and appropriate width of bars	1
Correct label for Y-axis and appropriate scale for Y-axis	1
Graph labelled/key provided	1
Drawing of graph	1- If 1-5 bars correctly drawn 2- If all 6 bars correctly drawn

NOTE:
If 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)

(11)
[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

4.1

- Blood groups are controlled by three alleles✓ I^A , I^B , i ✓which in combination will provide four different phenotypes namely blood groups A, B, O and AB. ✓
- An individual with blood group A✓ ,will inherit one allele✓ from each parent✓ and will therefore inherit a genotype of either I^Ai✓ or $I^A I^A$ ✓from his parents
- An individual with Blood group B✓ will inherit one allele from each parent and will therefore inherit genotype of either I^Bi✓ or I^BI^B✓ ; and
- An individual with blood group AB✓ will inherit one allele from each parent and will have both✓ alleles I^A and I^B which are co - dominant✓, and
- An individual with blood group O✓ will inherit i✓ allele from both parents and will be homozygous recessive (ii) ✓
- The blood of each male as well as the baby's blood must be tested.
- If the baby's blood group is O, then the father with blood group AB✓ will be eliminated✓ as he does not✓ carry the recessive O✓(i) allele.
- Should the father have a blood group B ✓ with a I^BI^B✓ genotype, then he will be eliminated as a potential father as he does not✓ have the recessive O(i) allele.
- Should the father have a blood group A✓ with a I^AI^A✓ (homozygous) genotype , then he will be eliminated✓ as a potential father as he does not✓ have the recessive O✓(i) allele.
- The father who also has a blood group B✓ but a genotype of I^Bi (Heterozygous)✓,could be a possible father as he is carrying ✓the i✓ allele of which the baby inherited.
- If the father who has a blood group A✓ with a genotype of I^Ai✓, could be a possible✓ father as he is carrying the i ✓allele of which the baby inherited.

(any 12)

DNA testing can further ✓confirm the father of the child by analysing✓ and comparing✓ the DNA genetic bands✓ of each✓ potential male parent✓ with the genetic bands✓ of DNA taken from the baby✓.
Should there be more ✓genetic bands that are identical ✓to that of the baby✓ then that would confirm ✓the male✓ parent/father. (any 5)

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	**All facts related to blood groups and DNA testing present**	**All facts related to blood groups and DNA testing are put into paragraphs**	**There is no irrelevant information. There is a cause –effect display of information regarding blood groups and DNA testing and all information is correct.**
Mark	1	1	1

Content (17)
Synthesis (3)
(20)

TOTAL SECTION C [20]

GRAND TOTAL 150