GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATION

2015

MEMORANDUM

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

GAUTENG DEPARTMENT OF EDUCATION
PREPARATORY EXAMINATION – 2015

LIFE SCIENCES
(Second Paper)

MEMORANDUM

PRINCIPLES RELATED TO THE MARKING OF 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 is incorrect, do not credit. If sequence and links becomes correct again, resume credit.

9. **Non-recognized abbreviations**
   Accept if first defined in the 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 recognizable 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 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. **Changes to the marking memorandum**
No changes must be made to the marking memoranda without consulting the Provincial Internal Moderator.

SECTION A

QUESTION 1

1.1	1.1.1	A✓✓	
	1.1.2	D✓✓	
	1.1.3	D✓✓	
	1.1.4	D✓✓	
	1.1.5	B✓✓	
	1.1.6	C✓✓	
	1.1.7	A✓✓	
	1.1.8	C✓✓	
	1.1.9	A✓✓	**(20)**
	1.1.10	B✓✓	

1.2	1.2.1	DNA profiling ✓	
	1.2.2	Gene ✓	
	1.2.3	Genetic engineering/genetic manipulation✓	
	1.2.4	Punctuated equilibrium ✓	
	1.2.5	Anaphase I ✓	
	1.2.6	Non-disjunction ✓	
	1.2.7	Chromosome ✓	
	1.2.8	Species✓	
			(8)
1.3	1.3.1	Both A and B✓✓	
	1.3.2	Both A and B✓✓	
	1.3.3	Both A and B✓✓	
	1.3.4	Both A and B✓✓	
	1.3.5	Both A and B✓✓	
	1.3.6	A only✓✓	
			(12)
1.4	1.4.1	Between 2-3 weeks✓✓	(2)
	1.4.2	10000-1000 ✓= 9000✓	(2)
	1.4.3.	20✓ weeks	(1)
			(5)
1.5	1.5.1	Africa✓	(1)
	1.5.2	Fossil record✓ Mitochondrial DNA /genetic ✓	(2)
	1.5.3	*Homo erectus*✓✓	(2)
			(5)
		TOTAL SECTION A:	**[50]**

QUESTION 2

2.1. 2.1.1 (DNA) replication ✓ (1)

2.1.2. Interphase✓ (1)

2.1.3 – The DNA molecule unwinds and unzips✓
– Template forms and nucleotides and bases pair up ✓
– Two identical DNA molecules form and rewind to form a helix✓ (3)
(5)

2.2 2.2.1 - Decide on how the information will be gathered✓
- Draw up a tool to collect data✓
- Decide on a suitable time and venue✓
- ***(Mark first TWO)*** ***(Any)*** (2)

2.2.2 - Ensure that the fingers are clean ✓before taking prints to ensure no smudging occurs✓
- Ensure that there is no duplication of prints ✓from the same person✓
(Mark first ONE) ***(Any 1x2)*** (2)

2.2.3 - Repeat the investigation✓
- Increase the sample size of individuals in survey✓ (2)

2.2.4 (a) Main types of fingerprints ✓ (1)
(b) Number of learners ✓ (1)
(c) Rejected✓– most learners in sample had plain whorl✓ fingerprints (2)
(10)

2.3. 2.3.1 *Australopithecus afarensis*✓ (1)

2.3.2 0,8✓ million yrs ago (MYA) (1)

2.3.3

MODEL 1	MODEL 2
A. afarensis is the common ancestor for *H. erectus*✓	*H. ergaster* is the common ancestor for *H. erectus*✓
A. *afarensis* is the common ancestor for *H. habilis*✓	*A. africanus is* a common ancestor for *H. habilis*✓

(5)
+ ✓(table)

2.3.4 It has both✓characteristics of *Austraopithecus* and *Homo* species (1)

2.3.5 - Mrs Ples✓
- Tuang child✓
- Little foot✓
- Karabo✓***(Any TWO)*** (2)
(10)

2.4	2.4.1	Mitosis✓it is a somatic cell / diploid✓	(2)
	2.4.2	It is haploid✓and does not have desirable genes	(1)
	2.4.3	Fertilisation was manipulated✓ by scientists/not naturally✓ fertilised	(1)
	2.4.4	- Cannot play God✓/ religious objection - May result in harmful mutations/ we don't know about long term effects - May result in the loss of biodiversity	(1) **(5)**
2.5	2.5.1	(a) RRGG✓ (b) rrgg✓	(1) (1)
	2.5.2	RG, RG, RG, RG✓✓/all RG /RG	(2)
	2.5.3	(a) Black eyes, grey tailfeathers ✓ (b) Red eye, grey tailfeathers✓	(1) (1) **(6)**
2.6	2.6.1	Continuous variation is characterised by range of intermediate✓ phenotypes resulting in histograms✓	(2)
	2.6.2	Discontinuous variation is characterised by unique✓ phenotypes resulting in bar graphs✓	(2) **(4)** **[40]**

QUESTION 3

3.1 3.1.1
- There is **variation**✓ in the length of the trunks among the elephants
- The elephants with the long trunks have the desirable characteristic✓/ long trunks can easily scoop water and grasp leaves from trees✓/for surviving under unfavourable or dry conditions
- More of the elephants with long trunks **survive**✓
- Most of the elephants with the short trunks **die**✓
- Long-trunked elephants reproduce✓ and
- produce offsprings with long trunks ✓(any 6) (6)

3.1.2
- Law of use and disuse
- Inheritance of acquired characteristics (2)

(8)

3.2 3.2.1 Walking✓on two feet✓ (2)

3.2.2 -Detect danger/predators easily✓ due to being taller✓
-Can carry their young/food✓ as both hands are free✓ (4)

3.2.3
- The bigger✓/wider/broader pelvis ensures that the attachment of the limbs is better spread✓
- The shorter✓pelvis allows body to be balanced ✓and held upright. (4)

(10)

3.3 3.3.1 A✓ (1)

3.3.2 + table✓

A	B
Cranium is smaller/ has a ridge✓	Cranium is larger/ more rounded✓
Brow ridges more pronounced✓	Brow ridges less pronounced✓

(5)

3.3.3.
- The jaws were prognathous✓/more pronounced to provide strength✓
- Brow ridges were more pronounced ✓ to provide strength✓ in the chewing action
- The well developed zygomatic arch ✓provides support / strength✓ for the muscles involved in chewing
- Well developed incisors ✓ for cutting ✓fibrous food

(any 1x2) (2)

(8)

3.4 3.4.1 (a) Normal male ✓ (1)

(b) X^DY✓✓ (2)

3.4.2 Both alleles are carried on the sex chromosomes✓ (1)

3.4.3 - Colour blindness is carried by a recessive allele✓
- On the X-chromosome✓
- Females have two X chromosomes✓/ Males have only one X chromosome
- Females must inherit two copies of the recessive allele✓ to show the disorder / females who inherit only one of the recessive allele are still normal ***(any 3)*** (3)

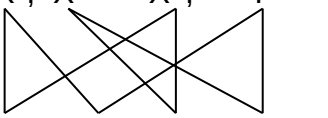
3.4.4

P_1/P_3 Phenotype Colour blind female x Normal male female✓

Genotype X^dX^d x X^DY✓

Meiosis

G/gametes X^d, X^d X^D, Y ✓



Fertilisation

F_1/F_3 Genotype X^DX^d;; X^dY; X^DX^d X^dY✓

Phenotype 2 normal daughters : 2 colour blind sons✓

***50%✓ chance of having a colour blind son**

P_1 and F_1✓

Meiosis and fertilisation✓

*__1 compulsory__ +any 6

OR

P_1/P_3 Phenotype colour blind female x Normal female ✓

Genotype X^dX^d x X^DY✓

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/F_3 Phenotype 2 normal daughters : 2 colour blind sons✓

***50%✓ chance of having a colour blind son**

P_1 and F_1✓

Meiosis and fertilisation✓ *__1 compulsory__+any 6 (7)

(14)

[40]

SECTION C

QUESTION 4

TRANSCRIPTION

- The double stranded DNA molecule unwinds✓/unzips
- When the hydrogen bonds break✓
- One strand is used as a template✓
- to form mRNA ✓
- Using free nucleotides✓ from the nucleoplasm
- The mRNA is complementary to the DNA✓/A-U, C-G
- This process is controlled by enzymes✓
- this process is called transcription✓ (max 6) (6)

TRANSLATION

- mRNA moves out of nucleus ✓
- through nuclear pore✓ into cytoplasm
- and attaches itself to ribosome✓
- The three adjacent bases on mRNA known as codons✓
- according to the codons on the mRNA
- tRNA✓ molecules with matching complementary anticodons✓
- bring the required amino acids✓ to the ribosome✓
- Amino acids link together by peptide bonds✓ to form a protein
- This process is called translation.✓ (max 7) (7)

Definition of mutation

Change✓ in the sequence of nitrogen bases✓
brings about a change in the gene composition ✓
and blood would not clot/absence of blood clotting factors resulting in haemophilia

- or absence of pigmentation/no melanin✓ resulting in albinism
- absence of proteins✓
- that comprise either for red and green cones✓/ photoreceptors
- in the eye resulting in colour blindness (max 4) (4)

Content: (17)
Synthesis: (3)

(20)

ASSESSING THE PRESENTATION OF THE ESSAY

Criterion	Relevance (R)	Logical sequence (L)	Comprehensive (C)
Generally	All information provided is relevant to the topic	Ideas are arranged in a logical sequence for each process	All aspects required by the essay have been sufficiently addressed
In this essay	Only information relevant to protein synthesis, mutations, haemophilia ,albinism and colourblindness is given	Information regarding protein synthesis, mutations, haemophilia, albinism and colour blindness arranged in a logical way	At least **three** correct points on transcription, translation and mutations
Mark	1	1	1

TOTAL SECTION C: 20
GRAND TOTAL: 150