GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATION

2017

MARKING GUIDELINES

LIFE SCIENCES (SECOND PAPER) (10832)

12 pages

GAUTENG DEPARTMENT OF EDUCATION

PREPARATORY EXAMINATION

LIFE SCIENCES
(Second Paper)

MEMORANDUM

PRINCIPLES RELATED TO MARKING LIFE SCIENCES – 2017

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

SECTION A

QUESTION 1

1.1	1.1.1	B✓✓		
	1.1.2	B✓✓		
	1.1.3	B✓✓		
	1.1.4	D✓✓		
	1.1.5	D✓✓		
	1.1.6	B✓✓		
	1.1.7	C✓✓		
	1.1.8	D✓✓		
			(8x2)	**(16)**
1.2	1.2.1	Foramen magnum ✓		
	1.2.2	Co-dominance✓		
	1.2.3	Punctuated Equilibrium ✓		
	1.2.4	Monohybrid ✓		
	1.2.5	Hypothesis ✓		
	1.2.6	Double Helix✓		
	1.2.7	Locus ✓		
	1.2.8	Colour-blindness✓		
			(8x1)	**(8)**
1.3.	1.3.1	B only✓✓		
	1.3.2	A only ✓✓		**(4)**
1.4	1.4.1	*Australopithecus africanus* ✓		(1)
	1.4.2	2.8 / 3 ✓ to 1 mya ✓		(2)
	1.4.3	5 ✓		(1)
	1.4.4	Flat face✓ / sloping face✓ no eyebrow ridges / eyebrow ridges✓ developed chin / no chin✓ not prognathous / prognathous✓ cranium size ✓ **MARK FIRST ONE ONLY**	**(Any 1)**	(1)
	1.4.5	*Homo erectus* ✓ *Homo sapiens* ✓ *Homo neanderthalensis* ✓ **MARK FIRST TWO ONLY**	**(Any 2)**	(2)

	1.4.6	Little foot ✓ Mrs Ples ✓ Taung Child ✓ **MARK FIRST ONE ONLY**	**(Any 1)**	(1)
	1.4.7	Fossil ✓ genetic / mtDNA ✓ cultural evidence✓ **MARK FIRST TWO ONLY**		(2)
				(10)
1.5	1.5.1	(a) grey ✓		(1)
		(b) vestigial✓		(1)
	1.5.2	Dihybrid ✓		(1)
	1.5.3	(a) BbWw ✓		(1)
		(b) grey-bodied, normal wings✓		(1)
		(c) BW Bw bW bw ✓✓ (All four must be correct to get the marks.)		(2)
				(7)
1.6	1.6.1	nucleus✓		(1)
	1.6.2	(a) amino acid ✓		(1)
		(b) peptide ✓		(1)
	1.6.3	(a) UAU ✓		(1)
		(b) ACA ✓		(1)
				(5)
			TOTAL SECTION A:	**50**

SECTION B

QUESTION 2

2.1 2.1.1 Histogram ✓ (1)

2.1.2 – shows a variation with a range of measurements ✓ that are linked / connected ✓ (2)

2.1.3 1.6 m ✓ (1)

2.1.4 5 ✓ (1)
(5)

2.2 2.2.1 (a) tRNA / transfer RNA✓ (1)

(b) translation ✓ (1)

2.2.2
- double strand of DNA unwinds ✓
- when hydrogen bonds break the two strands separate✓ / unzips
- one strand is used as a template ✓ to form mRNA
- called transcription ✓
- using free RNA nucleotides ✓from the nucleoplasm
- the mRNA is complementary to the DNA ✓

Any 5 marks (5)

2.2.3 28 + 28 = 56 ✓
100 – 56 = 44 ✓
44 ÷ 2 ✓ = 22 % ✓

Any 2 marks for workings + 1 mark for correct answer (3)

2.2.4
- The sequence of nitrogen bases on DNA will change. ✓
- This would cause a corresponding change on mRna / codons.✓
- A different amino acid will be brought in by tRNA ✓ to match the changed codon
- This will lead to a change in the sequence of amino acids in the polypeptide chain✓
- Therefore a different protein will form, ✓ / ineffective protein.

Any 4 marks (4)

2.2.5

DNA	RNA
Sugar is deoxyribose ✓	Sugar is ribose ✓
Pairing of bases ✓	No pairing of bases ✓
Has weak hydrogen bond ✓	No weak hydrogen bond ✓
Long chain ✓	Short chain ✓
Double-stranded molecule ✓	Single-stranded molecule ✓
Nitrogen base thymine ✓ / ATCG	Nitrogen base uracil ✓ / AUGC

Any 2 x 2 = 4 marks Table + 1 (5)
(19)

2.3 2.3.1 (a) centriole✓ (1)

(b) homologous chromosomes ✓ / bivalent (1)

2.3.2 Metaphase I ✓ (1)

2.3.2 Homologous chromosomes present✓
Chromosomes are lined at the equator ✓
(Any 1) (1)

2.3.4 Because homologous / paired chromosomes present ✓✓ (2)

2.3.5 2 / Two ✓ (1)

2.4
- Genetic variation causes variation in phenotype / characteristics of organisms✓
- some better suited / have more favourable characteristics ✓
- reference to natural selection of more suitable organisms ✓
- selection of different phenotypes in different environments ✓
- eventually leads to species change / change in gene pool / change in gene frequencies ✓

(Any 2) (2)
(9)

2.5 2.5.1 The manipulation of genetic material✓ of an organism to get desired characteristics✓ / process where genes on the DNA are changed,✓ manipulated to produce a new organism. ✓ **(Any 2)** (2)

2.5.2 Select specific questions to address the research question ✓
Arrange time for survey to take place ✓
Design a table to record the results ✓
Select suitable areas for the survey ✓
Identify a sample that is representative of the South African population to question ✓ **(Any 2)** (2)

2.5.3 (a) **<u>Benefits</u>**
Production of medication / resources cheap ✓
Control pests; with specific genes inserted into a crop ✓
Using specific genes to increase crop yields ✓ / food security
Select genes to increase shelf-life of plant products. ✓
(Any Two) **Mark first two only** (2)

(b) **<u>Disadvantages</u>**
Expensive / research money can be used for other needs ✓
Interfering with nature / affecting biodiversity / immoral / against God's will ✓
Potential health hazard ✓
Unsure of the long-term effects✓

(Any 1) (1)
(7)
[40]

QUESTION 3

3.1 3.1.1 Incomplete dominance ✓ (1)

3.1.2 Some pigs have pink coloured coats / new / third phenotype occurred / neither red nor white in the phenotype is dominant ✓✓ (2)

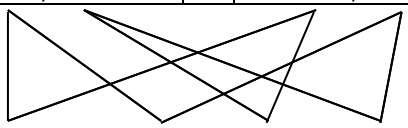
3.1.3 (a) 1 = RR ✓ (1)

(b) 2 = RW ✓ (1)

3.1.4

P_1 / parent	phenotype	Red coat male	x	Pink female ✓
	genotype	RR	x	RW
	Meiosis			
	G / gametes	R ; R	x	R ; W✓

Fertilisation



F_1 / offspring	genotype	RR ; RW ; RR ; RW✓
	phenotype	2 red : 2 pink✓
		***50% or 2 in 4 / 1 in 2 / half✓**

Parents and offspring✓ / P_1 and F_1
Meiosis and fertilisation✓ **Any 5 + 1*(Compulsory)**

OR

P_1 / parent	phenotype	Red coat male	x	pink female ✓
	genotype	RR	x	RW ✓
	Meiosis			
	G / gametes	R ; R	x	R ; W ✓

Fertilisation

Gametes	R	R
R	RR	RR
W	RW	RW

✓✓

F_1 / offspring	genotype	RR ; RR; RW; RW✓
	phenotype	2 red : 2 pink✓
		***50% or 2 in 4 / 1 in 2 / half✓**

Parents and offspring✓ / P_1 and F_1
Meiosis and fertilisation✓ **Any 5 + 1*(Compulsory)**

(6)
(11)

3.2 3.2.1 (a) with OR without artificial selection✓ (1)

(b) number of plants with more hairs on leaves✓ (1)

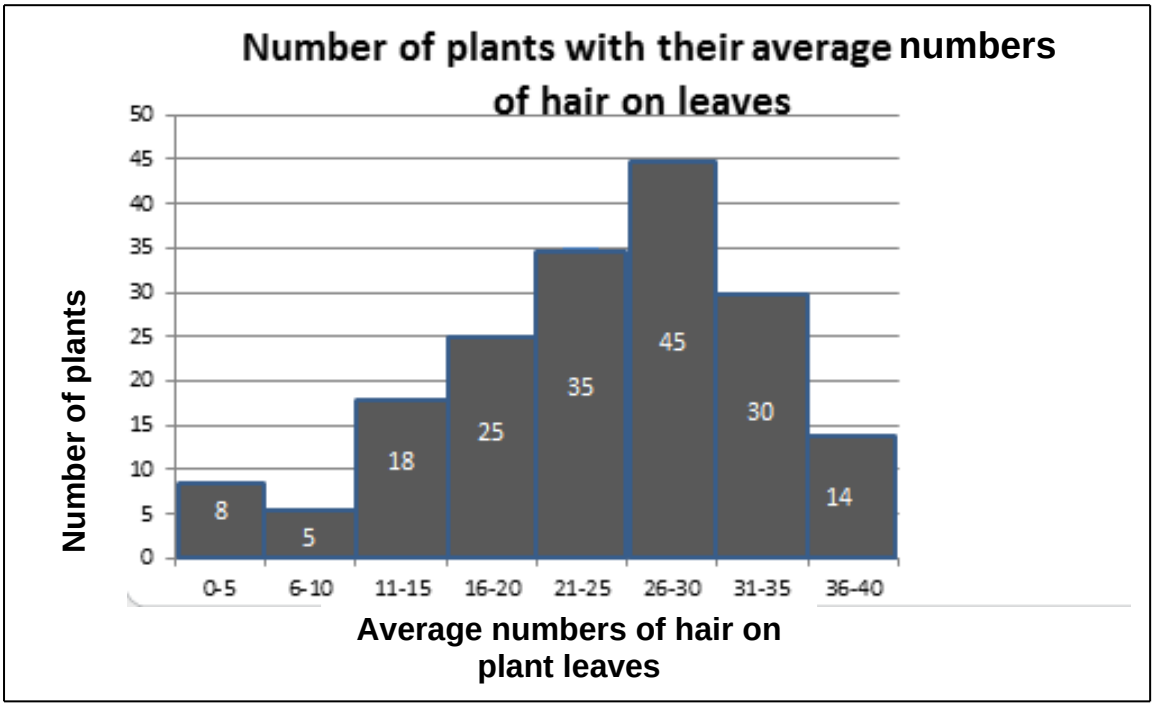
3.2.2
- Same number of plants used in both generations
- Same species of plant
- Same size of pot in which the seeds are planted
- Same amount and type of soil
- Same amount of water used to irrigate the plants
- Same environmental conditions for the investigation

Mark first TWO only **(Any 2)** (2)

3.2.3 With artificial selection there were more plants with more hairs on the leaves✓ ✓ (2)

3.2.4 Repeat the investigation ✓ and take the average
Increase the sample size ✓ (2)

3.2.5



(6)

Rubric for assessment of the graph

	Mark Allocation
Correct type of graph	1
Caption for graph	1
Correct label for X-axis and label for Y-axis	1
Correct scale for X-axis and scale for Y-axis	1
Plotting of points	1 (1 to 4 points correct) 2 (All 8 points correct)
Note: If the wrong 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.	

3.2.6

Artificial	Natural
Humans represent the selective force✓, Selection is in response to satisfying, human needs✓ May involve one or more species ✓, Occurs over a shorter period of time.✓	The environment is the selective force✓ Selection is in response to suitability to the environment for the organism✓ Occurs within a species✓ Occurs over a longer period of time✓ **Any 2x2** **Mark first TWO only**

(4)

Tabulation is not necessary. **(18)**

3.3 3.3.1 All giraffes had short necks. ✓
These giraffes frequently stretched their necks.✓
They did this to reach the leaves that were available only higher up the trees.✓
As a result, their necks became longer. ✓
The characteristic for long necks acquired in this way was then passed on to the next generation. ✓
Eventually all the giraffes had longer necks. ✓

(Any 3) (3)

3.3.2 There is no evidence ✓to show that acquired characteristics are inherited ✓ /
There is no evidence ✓that structures used more frequently became more developed or vice versa✓ / a change in phenotype ✓does not lead to a change in genotype✓ (2)

(5)

3.4 3.4.1 Contain the same chromosomes ✓because the embryonic cell has divided by mitosis ✓/ they are all produced from nuclei of the donor sheep ✓ which multiply / divide by mitosis✓ therefore have the same DNA ✓ (2)

3.4.2 The nucleus and genetic material ✓originated from another sheep ✓ / the nuclei of the foster sheep were not used ✓and therefore did not contain the same genetic material / the ova used did not contain nuclei✓ / it is the nucleus which contains the genetic material ✓ (2)

3.4.3 Animals or plants with superior / favourable characteristics ✓ can be produced to enhance food production ✓ / biotechnology. (2)

(6)

[40]

TOTAL SECTION B: 80

SECTION C
QUESTION 4

Darwin's theory of evolution by natural selection:

- Organisms produce a large number of offspring. ✓
- There is a great deal of genetic variation ✓ amongst the offspring.
- Some have favourable characteristics ✓
- and some do not. ✓
- When there is a change in the environmental conditions✓ / if there is competition
- then organisms with characteristics, which make them more suited, survive ✓
- whilst organisms with unfavourable characteristics, which make them less suited, die.✓
- The organisms that survive, reproduce✓
- and thus, pass on the allele for the favourable characteristic to their offspring.✓
- The next generation will therefore have a higher proportion of individuals with the favourable characteristic.✓

ANY 8

Speciation through geographic isolation:

- A population ✓of a single species
- becomes separated ✓
- by a geographical barrier i.e. mountain range, continental drift, river (any example) ✓
- causing the population to split into two. ✓
- There is now no gene flow between the two populations. ✓
- Since each population may be exposed to different environmental conditions / the selection pressure may be different ✓
- 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 interbreed. ✓
- The two populations are now different species. ✓ **ANY 9**

Content: (17)
Synthesis: (3)

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 / cause-effect sequence.	All aspects required by the essay have been sufficiently addressed.
In this essay	Only information relevant to: - Natural Selection - Speciation by geographic isolation	The description of natural selection and speciation by geographic isolation are in a logical sequence.	At least correct points included: - Natural Selection **(5/8)** - Speciation by geographic isolation **(5/9)**
Mark	**(R) ✓ 1**	**(L) ✓ 1**	**(C) ✓ 1**

TOTAL SECTION C: 20
TOTAL: 150