education

MPUMALANGA PROVINCE

REPUBLIC OF SOUTH AFRICA

NATIONAL
SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P2

SEPTEMBER 2026

AMMENDED MARKING GUIDELINES

MARKS: 150

These marking guidelines consist of 13 pages.

Copyright reserved

PRINCIPLES RELATED TO MARKING 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 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 annotation 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 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 is accepted at the provincial memo discussion meeting

14. **If only letter is asked for and only name is given (and vice versa)**
    Do not credit.

Copyright reserved

SECTION A

QUESTION 1

1.1	1.1.1	B✓✓		
	1.1.2	A✓✓		
	1.1.3	B✓✓		
	1.1.4	B✓✓		
	1.1.5	C✓✓		
	1.1.6	C✓✓		
	1.1.7	D✓✓		
	1.1.8	A✓✓		
	1.1.9	B✓✓		
	1.1.10	C✓✓		**(20)**
1.2	1.2.1	Nucleoplasm✓		
	1.2.2	Mitochondrial DNA✓/mtDNA		
	1.2.3	Mitosis✓		
	1.2.4	Crossing over✓		
	1.2.5	Cloning		
	1.2.6	Co-dominance✓		
	1.2.7	Autosomes✓		
	1.2.8	Foramen Magnum✓		
	1.2.9	Cultural✓evidence		
	1.2.10	Artificial selection✓/selective breeding	(10 x 1)	**(10)**
1.3	1.3.1	A only✓✓		
	1.3.2	B only✓✓		
	1.3.3	Both A and B✓✓	(3 x 2)	**(6)**
1.4	1.4.1	(a) - $C^P C^Y$✓ and - $C^P C^Y$✓ **OR** - both $C^P C^Y$✓✓		(2)
		(b) - $C^P C^P$✓ - $C^P C^Y$✓ - $C^Y C^Y$✓		(3)
		(c) 3 pink : 1 yellow✓✓		(2)
				(7)

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. This is applicable to all official languages.

19. **Changes**
No changes must be made to the marking guidelines without consulting the Provincial Internal Moderator.

Copyright reserved

SECTION A

QUESTION 1

1.1	1.1.1	B✓✓		
	1.1.2	A✓✓		
	1.1.3	B✓✓		
	1.1.4	B✓✓		
	1.1.5	C✓✓		
	1.1.6	C✓✓		
	1.1.7	D✓✓		
	1.1.8	A✓✓		
	1.1.9	B✓✓		
	1.1.10	C✓✓		**(20)**
1.2	1.2.1	Nucleoplasm✓		
	1.2.2	Mitochondrial DNA✓/mtDNA		
	1.2.3	Mitosis✓		
	1.2.4	Crossing over✓		
	1.2.5	Cloning		
	1.2.6	Co-dominance✓		
	1.2.7	Autosomes✓		
	1.2.8	Foramen Magnum✓		
	1.2.9	Cultural✓evidence		
	1.2.10	Artificial selection✓/selective breeding	(10 x 1)	**(10)**
1.3	1.3.1	A only✓✓		
	1.3.2	B only✓✓		
	1.3.3	Both A and B✓✓	(3 x 2)	**(6)**
1.4	1.4.1	(a) - $C^P C^Y$✓ and - $C^P C^Y$✓ **OR** - both $C^P C^Y$✓✓		(2)
		(b) - $C^P C^P$✓ - $C^P C^Y$✓ - $C^Y C^Y$✓		(3)
		(c) 3 pink : 1 yellow✓✓		(2) **(7)**

1.5	1.5.1	Phylogenetic tree✓	(1)
	1.5.2	Four✓/4	(1)
	1.5.3	Hominidae✓	(1)
	1.5.4	Ardipithecus ramidus✓ (Genus name must start with capital and species name start with lower case, can mark if not underlined)	(1)
	1.5.5	3 million years ago✓ (accept 3.1mya – 3mya)	(1)
	1.5.6	Homo erectus✓	(1)
	1.5.7	1.5 million year ago✓	(1) **(7)**
		TOTAL SECTION A:	**50**

SECTION B

QUESTION 2

2.1	2.1.1	DNA profiling✓	(1)
	2.1.2	(a) The victim from the second crime scene✓ and his brother✓	(2)
		(b) DNA from both of them was found at the crime scene✓	(1)
	2.1.3	(a) The victim's brother✓	(1)
		(b) The victim's skin was found under his brother's fingernails✓ which implies that the two men had been fighting	(1)
	2.1.4	The police were able to match the DNA samples✓ from the two crime scenes✓ **OR** The same evidence✓ (DNA samples) were found in both crime scenes✓	(2) **(8)**
2.2	2.2.1	(a) mRNA✓/messenger RNA	(1)
		(b) Transcription✓	(1)
	2.2.2	AGT✓	(1)
	2.2.3	4✓	(1)
	2.2.4	Ribose✓	(1) **(5)**
2.3	2.3.1	484✓	(1)
	2.3.2	- The sequence of nitrogenous bases/nucleotides on a DNA molecule changes✓ - from GCT to GTT✓/second base in DNA triplet change from C to T - The codon CGA changed to CAA✓ - The tRNA molecule with the anticodon GCU✓ - is now replaced by a tRNA molecule with the anticodon GUU✓ - The sequence of amino acids changes✓ and - a different/new protein is formed✓	(7) **(13)**

2.4	2.4.1	Prophase I✓		(1)
	2.4.2	(a) Nuclear membrane✓		(1)
		(b) Centriole✓		(1)
	2.4.3	- A chromosome consists of two chromatids✓ - held together by a centromere✓ to form replicated chromosomes - Chromatids consist of DNA✓ - Containing genes✓ - Chromatin network shortens and thickens/condenses to form chromosomes✓	Any	(3)
	2.4.4	Somatic✓ cell		(1)
	2.4.5	- It contains a diploid chromosome number✓ - Has homologous chromosome pairs✓ - The chromosomes are replicated✓ **(Mark first ONE only)**	Any	(1) **(8)**
2.5	2.5.1	Gonosomes✓		(1)
	2.5.2	Chromosomal✓ mutation		(1)
	2.5.3	- Non-disjunction of chromosomes pair 23✓ /chromosome pair 23 fails to separate - This causes one gamete to contain both an X and Y chromosome✓ - If this gamete fuses with a normal ovum✓ - The ovum contributes another X chromosome✓ - Resulting in a zygote with XXY/XYX chromosomes ✓		(5) **(7)**
2.6	2.6.1	- Fur Colour✓ - Fur length✓		(2)
	2.6.2	(a) Short fur and black fur✓✓/ black short fur		(2)
		(b) Tb✓/bT tb✓/bt		(2)
	2.6.3	The various factors/ alleles controlling the different characteristics are separate entities✓ not influencing each other in any way, and sorting themselves out independently during gamete formation✓		(2) **(8)**

2.7	2.7.1	1✓/One		(1)
	2.7.2	More than two alleles✓ possibly at one locus		(1)
	2.7.3	- I^Ai✓ - ii ✓		(2)
	2.7.4	- Blood groups can be used to exclude a particular man✓ - but it cannot confirm that a particular man is the father✓ - since a large portion of the population have the same blood group✓ **(Mark first TWO only)**	Any	(2) **(6)** **[50]**

QUESTION 3

3.1 3.1.1 - Male have only one X chromosome✓/The Y-chromosome does not have this allele and
- have to inherit only one recessive allele✓ to have white teeth

OR

- Females have two X chromosomes✓ and have to
- inherit two recessive alleles to have white teeth✓

Any (2)

3.1.2 P_1 Phenotype Male with brown teeth x Female with white teeth✓
Genotype X^BY x X^bX^b ✓
Meiosis
G/Gametes X^B , Y x X^b , X^b ✓



Fertilisation
F_1 Genotype $X^B X^b$, $X^B X^b$, X^bY , X^bY✓

Phenotype 1 female with brown teeth **:** 1 male with white teeth✓*
(phenotypes must be correct)

P_1 and F_1✓
Meiosis and fertilisation✓ ***1 compulsory mark** + Any 5

OR

P_1 Phenotype Male with brown teeth x Female with white teeth✓
Genotype X^BY x X^bX^b ✓

Meiosis

Fertilisation

Gametes	X^B	Y
X^b	$X^B X^b$	X^bY
X^b	$X^B X^b$	X^bY
1 mark for correct gametes 1 mark for correct genotype		

F_1 Phenotype 1 female with brown teeth **:** 1 male with white teeth✓*
(phenotypes must be correct)
***1 compulsory mark** + Any 5

P_1 and F_1✓
Meiosis and fertilisation✓

(6)
(8)

3.2	3.2.1	Manipulation of genetic material (DNA/genes) in a cell of an organism in order to get the desired characteristics✓/ to satisfy human needs	(1)
	3.2.2	- To ensure rice contains✓ - the desired characteristics✓ **OR** - A gene code for proteins✓ - If other genes or DNA are present, other proteins will be made by the plant✓ **OR** - Inserting other genes✓/DNA - could result in undesirable characteristics in rice✓ **OR** - Inserting other genes✓/DNA - could have unknown/undesirable effects on people✓ **(Mark first ONE only)** Any	(2)
	3.2.3	- To get many copies (of the gene)✓ - In case the gene does not insert into the plasmid/host✓ - To increase the chances of the plasmid taking the gene in✓ - Repeated attempts to insert the plasmid may be needed✓ - To insert the gene into multiple plasmids✓	(2)
	3.2.4	Plasmid✓/bacteria	(1)
	3.2.5	- To allow the golden rice plant to adapt✓/survive in the local environment✓/conditions - To increase the vitamin A✓ in the local rice types✓ Any	(2) **(8)**
3.3	3.3.1	Biological evolution is the change in the characteristics of species over time✓	(1)
	3.3.2	A - Fossil✓ B – Modification by descent✓/ homologous structures/comparative anatomy C - Biogeography✓	(3)
	3.3.3	Organisms with **similar characteristics**, that are able to **interbreed** and produce **fertile offspring**✓	(1)
	3.3.4	- Mutations✓ - Random mating✓ - Random fertilization✓ Any order	(3) **(8)**

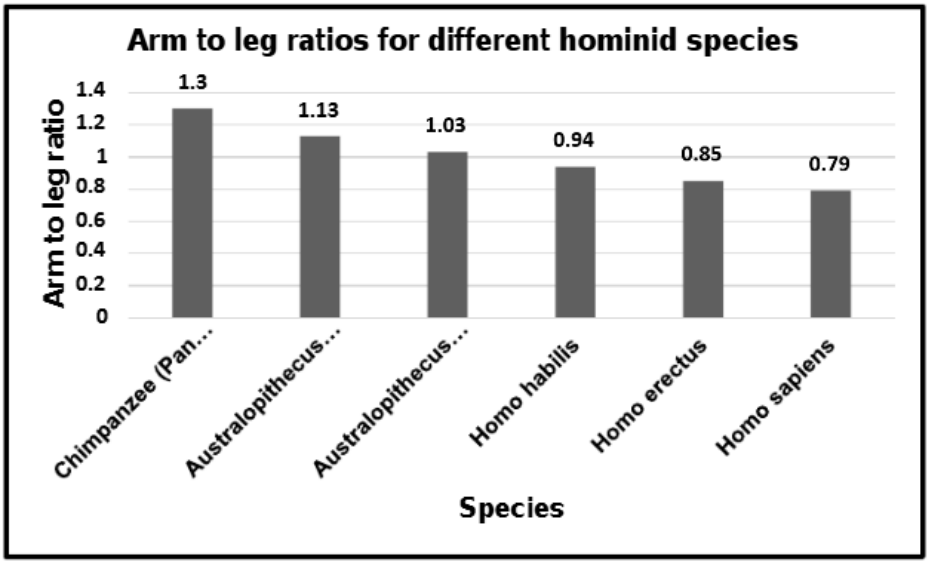
3.4. Darwin's theory of evolution by natural selection:
-There is a great deal of variation✓ amongst the offspring.
- Some have favourable characteristics and some do not ✓
- When there is a change in the environmental conditions✓ or if there is competition,
- the organisms with characteristics, which 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 **(6)**

3.5 3.5.1
- Freely rotating shoulder joints✓
- Longer upper arms✓
- Rotating elbow joints✓
- Pentadactyl✓/ 5 finger hand
- Opposable thumb✓
- Naked finger tips✓
- Flat nails✓ instead of claws

(Mark first THREE only) Any (3)

3.5.2 Arm-to-Leg Ratio = Arm Length ÷ Leg Length
= 75 ÷ 95✓
= 0.79✓ (accept 0.8) (2)

3.5.3



Description	Mark allocation
Caption (**C**)	1
Bar graph drawn (**T**)	1
Scale (bar width and spaces, y axis scale) (**S**)	1
Labels (y axis and x axis in order from oldest to youngest, chimpanzee can be random) (**L**)	1
Plotting (**P**)	1 – 1 to 5 bars plotted correctly 2 – All bars plotted correctly

(6)

3.5.4 Older species has a higher arm to leg ratio✓/ longer arms/shorter legs

OR

Younger species has a lower arm to leg ratio✓/ longer legs/ shorter arms (1)

(12)

3.6 3.6.1

- A population of ancestral porkfish becomes separated by the Isthmus of Panama✓*
- the population splits into two. ✓
- There is now no gene flow between the two populations. ✓
- Since each population was 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 namely Atlantic and Panama Porkfish.✓*

* **2 Compulsory** + any other 6 **(8)**

[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150