

NATIONAL SENIOR CERTIFICATE

GRADE 12

SEPTEMBER 2024

AMENDED LIFE SCIENCES P2 MARKING GUIDELINE

MARKS: 150

This marking guideline consists of 11 pages.

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 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 are incorrect, do not credit. If sequence and links become correct again, resume credit.
 - **Non-recognised abbreviations** Accept if first defined in answer. If not defined, do not credit the unrecognised abbreviation but credit the rest of the answer if correct.

10. Wrong numbering

9.

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.

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- 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. Marking guideline 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 appear(s) 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.

SECTION A

QUESTION 1

- 1.1 1.1.1 B√√
 - D√√ 1.1.2
 - 1.1.3 A√√
 - 1.1.4 A ✓ ✓
 - 1.1.5 B√√
 - 1.1.6 C ✓ ✓
 - 1.1.7 C ✓ ✓
 - 1.1.8 D√√
 - $\mathbf{C}\checkmark\mathbf{\checkmark}$ Schools who got the errata in time will mark according to the 1.1.9 Memo, schools did not get the errata in time will use the Conversion table

(9 x 2) (18)

CONVERSION TABLE (CT) For Question 1.1.9			
Old Mark /16	Add	New Mark /18	
2	0	2	
4	0	4	
6	1	7	
8	1	9	
10	1	11	
12	1	13	
14	2	16	
16	2	18	

- Karyotype ✓/karyogram Chloroplast ✓ 1.2 1.2.1
 - 1.2.2
 - Chiasma √/chiasmata 1.2.3
 - 1.2.4 (Blood group) O ✓
 - 1.2.5 Locus √/loci
 - Template ✓ 1.2.6
 - Down syndrome √/trisomy 21 1.2.7
 - (Weak) hydrogen ✓ bonds 1.2.8
 - 1.2.9 Haploid ✓

Plasmid ✓

1.3	1.3.1 1.3.2	B only ✓✓ A only ✓✓		
	1.3.3	A only $\checkmark \checkmark$	(3 x 2)	(6)
	1.4.1	Genetic engineering ✓/Recombinant DNA/Genetic modification/genetic manipulation		(1)

- (1) 1.4.3 Enzyme ✓ (1)
- 1.4.4 Promotes skeletal/muscular growth ✓ (a) (1) (b) Produces insulin ✓ (1)

(9 x 1)

(9)

1.4.2

1.4.5	 Bacteria: Reproduce very rapidly ✓ Reproduce asexually ✓/by mitosis/ binary fission Exists everywhere ✓ Are simple organisms ✓ / unicellular DNA is in the form of a plasmid ✓ Bacteria do not destroy foreign DNA✓ (Mark first TWO only) 	
1.4.6	Attach the gene for human growth hormone to structure X \checkmark /plasmid	(1)
1.5 1.5.1	Punctuated equilibrium ✓	(1)
1.5.2	 2 - (Niles) Eldredge ✓ - (Stephen) Gould ✓ 	(2)
1.5.3	$\begin{array}{cccc} (a) & 1 \checkmark \\ (b) & 2 \checkmark \\ (c) & 1 \checkmark \end{array}$	(1) (1) (1)
1.5.4	 A – organisms do not evolve ✓/change/ remain the same/little change to the organism B – organisms rapidly evolve ✓/change 	(2)
1.5.5	Biological ✓ evolution TOTAL SECTION A:	(1) 50

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QUESTION 2

2.1.1	Prophase I ✓	(1)
2.1.2	 (a) Centriole √/centrosome (b) Homologous ✓ chromosomes (c) Anaphase II ✓ 	(1) (1) (1)
2.1.3	6 ✓ /3 pairs/2	(1)
2.1.4	 DNA is made-up of: deoxyribose sugar ✓ phosphate ✓ and nitrogenous base✓ (Any 2) 	(2)
2.1.5	 DNA replication √* Chromosomes which were single threads become double √ Each chromosome will now consist of two chromatids joined by a centromere √ doubling the genetic material √ 	
	Compulsory mark ✓ * 1 + Any 2	(3)
2.1.6	 Part D/spindle fibre attaches to centromere√ Allowing for homologous chromosomes to be on either side of the equator √ / ensuring that each chromosome is properly aligned Allowing for random arrangement/ accurate separation of chromosomes/ reducing errors during Anaphase I√ (Any 3) 	(3)
Transla	ation √*	
 Eac Whe the ther Ami 	h tRNA carries a specific amino acid \checkmark en the anticodon on the tRNA matches \checkmark codon on the mRNA \checkmark n tRNA brings the required amino acid to the ribosome. \checkmark no acids become attached to each other by peptide bonds. \checkmark Compulsory mark \checkmark * 1 + Any 4	(5)
2.3.1	 Human embryos √/ Blastocyst/ Embryonic cells Umbilical cord blood √/cord blood Bone marrow √ Placental tissue √ Adult stem cells √ Teeth √ Skin √ Amniotic fluid √ Spinal cord √ (Mark first TWO enky) 	(2)
	2.1.1 2.1.2 2.1.3 2.1.4 2.1.5 2.1.5 2.1.6 Transla - Eac - Whe - the - the - the - the - Ami 2.3.1	 2.1.1 Prophase I ✓ 2.1.2 (a) Centriole ✓/centrosome (b) Homologous ✓ chromosomes (c) Anaphase II ✓ 2.1.3 6 ✓ /3 pairs/2 2.1.4 DNA is made-up of: deoxyribose sugar ✓ phosphate ✓ and nitrogenous base✓ (Any 2) 2.1.5 DNA replication ✓* Chromosomes which were single threads become double ✓ Each chromosome will now consist of two chromatids joined by a centromere ✓ doubling the genetic material ✓ 2.1.6 Part D/spindle fibre attaches to centromere✓ Allowing for random arrangement/ accurate separation of chromosomes/ reducing errors during Anaphase I✓ When the anticodon on the tRNA matches ✓ the codon on the mRNA ✓ then tRNA brings the required amino acid ✓ Amino acids become attached to each other by peptide bonds. ✓ Compulsory mark ✓* 1 + Any 4 2.3.1 Human embryos ✓/ Blastocyst/ Embryonic cells Umbilical cord blood ✓/cord blood Bone marrow ✓ Placental tissue ✓ Adult stem cells ✓ Trensi of this end to blood Bone marrow ✓ Placental tissue ✓ Adult stem cells ✓ Spinal cord ✓

2.3.2 Macular degeneration \checkmark

(1)

2.3.3

2.3.4

	-	
	,	
	1	

(3)

- 4 √/four (1) (a) Valine ✓ (1)
- (b) -the DNA triplet will be ACG ✓ instead of ACC
 -the codon will be UGC ✓ instead of UGG
 -the amino acid will be cysteine ✓ instead of tryptophan
 OR
 - The C in the mutant gene ACC is removed and replaced with G \checkmark
 - so that the codon UGC will brings the amino-acid cysteine ✓
 - instead of the codon UGG bringing tryptophan ✓

(C)

-

mRNA/ molecule with the complementary codon



Guidelines for marking the drawing.

Criteria	Mark
Correct caption (H)	1
One strand drawn (D)	1
3 nucleotides drawn (N)	1
Correct codon / 3 correct sequence of	
nitrogenous bases (C)	1

(4)

2.4.1 - A gene /an allele located on any of chromosomes 1–22 √/non-sex chromosomes that is only expressed in the homozygous condition \checkmark / that is masked by the dominant allele in the heterozygous condition (2) 2.4.2 Н√ (1)2.4.3 Child H inherited one recessive allele √/b _ From each parent ✓ (2)_ 2.4.4 Complete ✓ dominance -OR When one allele may be dominant and mask the expression of the other allele, which is recessive \checkmark / the dominant allele is expressed in the organism's phenotype / the recessive allele is only expressed if the organism has two copies of the recessive allele. (1)

8		LIFE SCIEN	CES P2	(EC/SEPTEMBER 2024)	
2.4.5	 K, L, M are mother F an and are the The dominal 	heterogygous ad recessive a refore unaffeo ant allele/B ma	$s \checkmark /Bb / inheritellele b causing Lcted \checkmark without Lasks the expres$	d Dominant allele B from the Leigh syndrome from father G Leigh sydrome. sion of the recessive allele √/b	(3)
2.5.1	Female ✓ wit	h fragile X syı	ndrome 🗸	(2)	
2.5.2	 Fragile X s chromosor Both males affected 	syndrome is c me √/X ^R s and females	aused by a dom s need only one	ninant allele on the X- dominant allele ✓/X ^R to be (2)	
2.5.3	P ₁	Phenotype	Male with fragile X ✓ X ^R Y	 x Female without fragile X ✓ x X^rX^r 	
Note: 2 marks for the phenotype of parents and no	Meiosis Fertilisation	G/gametes	X^R, Y	$\begin{array}{c} X \\ X \\ \end{array} \\ X \\ \end{array} \\ X^{r}, \\ X^{r} \\ \checkmark \\ \end{array}$	
mark is awarded for the genotype of the	F1	Genotype Phenotype	X ^R X ^r ; X ^F 2 females with	X^{r} ; $X^{r}Y$; $X^{r}Y \checkmark$	
it is given in the question	They have a	0% √*chanc	without fragile	X syndrome \checkmark	
			OR		
	P 1	Phenotype	Male with fragile X ✓	x Female without fragile X ✓	
	Meiosis	Genotype G /gametes	Х ^к Ү Х ^к , Ү	$ \begin{array}{ccc} x & X^{r}X^{r} \\ x & X^{r}, & X^{r} \checkmark \end{array} $	

Fertilisation **F**1

Gametes	XR	Y		
Xr	X ^R X ^r	X ^r Y		
Xr	X ^R X ^r	X ^r Y		
Correct genotypes √				

Phenotype

2 females with fragile X : 2 males without fragile X syndrome \checkmark

They have a 0% \checkmark *chance of having a son with fragile X syndrome.

 P_1 and $F_1 \checkmark$ Meiosis and fertilisation \checkmark

Any 6 + *1 Compulsory (7) [50]

QUESTION 3

3.1	3.1.1	There are two characteristics being crossed √/ inheritance of two characteristics	(1)
	3.1.2	Artificial selection ✓/ Selective breeding	(1)
	3.1.3	To obtain a desired characteristic \checkmark (no mark if the characteristic is mentioned because it is in the question)	(1)
	3.1.4	(a) bbhh ✓✓	(2)
		(b) BH, Bh, bH , bh (1-3 correct) \checkmark (all 4 correct) $\checkmark \checkmark$	(2)
	3.1.5	9:3:3:1 ✓✓	
		OR 9 baby hair coat with smooth hair 3 baby hair coat with curly hair 3 black hair coat with smooth hair 1 black hair coat with curly hair	(2)
3.2	3.2.1	Non-existent by 2035 \checkmark (not just non-existent - have to include 2035 because the question says in the near future)	(1)
	3.2.2	 (a) - Habitat loss ✓ Overfishing of their main food sardines ✓ (not just overfishing) (Mark first TWO only) 	(2)
		 (b) - Breeding at different times of the year √/ Temporal isolation - (Species-specific) courtship behaviour √NOT examples (Mark first TWO only) 	(2)
	3.2.3	(a) - Less sardines will be sold√/decrease in profit	
In (a) Rem	ove the se	econd OR	
bullet - Thi marked as	cause and	 Money will be spent on other expensive sources of protein√/meat Reducing spending on other food items√ 	
effect		(Mark first ONE only) (1 x 2)	(2)
		 (b) - More sardines/food will be available ✓ - More African penguins will survive ✓/not die/ increased reproduction/ increased population 	
		(Mark first ONE only) (1 x 2)	(2)

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10		LIFE SCIENCES P2 (EC/SEPTEMBER :	<u>2024)</u>
3.3		If a population of a single species becomes separated by a geographical barrier \checkmark (sea, river, mountain, lake) then the population splits into two. \checkmark There is now no gene flow between the two populations. \checkmark Since each population may be exposed to different environmental conditions \checkmark /the selection pressure may be different natural selection occurs independently \checkmark in each of the two populations such that the individuals of the two populations become very different \checkmark genotypically and phenotypically \checkmark Even if the two populations were to mix again \checkmark they will not be able to interbreed \checkmark The two populations are now different species. \checkmark (Any 7)	(7)
3.4	3.4.1	Australopithecus africanus ✓	(1)
	3.4.2	(a) C ✓	(1)
		(b) D ✓	(1)
		(c) A ✓	(1)
	3.4.3	 Shape of B/pelvis is shorter and wider than that of primitive apes ✓ and slightly longer and narrower compared to human ✓ pelvis. 	(2)
	3.4.4	 The cranium/brain size increased ✓ in modern humans to allow more intelligence ✓/process more information/ better communication/ written language 	(2)
	3.4.5	 (a) Genetic ✓/mtDNA (Not Cultural evidence – check exam guidelines) 	(1)
		(b) Fossils of Australopithecus were found in Africa <u>ONLY</u> ✓ this suggest that ancestors of homo sapiens originated in Africa ✓	(2)
3.5	3.5.1	To determine if the individuals who made the Laetoli footprints walked using a human-like bipedalism or a more ape-like movement \checkmark	(1)
	3.5.2	Toe depth ✓	(1)
	3.5.3	 Ethical considerations Obtain permission from participants. ✓ Get Ethics Approval/Protect the Privacy of participants and ensure Confidentiality Logistical arrangements/Design of study Decide on sample size. ✓ Decide on time ✓/date to conduct the investigation Data Collection Methods Decide on the measuring tool ✓/materials to be used. Decide on how results will be recorded. ✓ (Mark first THREE only) 	(3)

3.5.4 - Investigation was done once ✓/not repeated

- Sample size consists of 8 participants ✓
- Did not take an average of many repetitions ✓
- Participants were not chosen at random ✓
- 3.5.5 Ape-like movement ✓
- 3.5.6 $\frac{2.2}{1.1} \checkmark = 2 \checkmark$ times / (accept ranges 2.1-2.2 for human-like bipedalism and 1.1-1.2 for Laetoli foodprint, but the answer will also change accordingly)

(2)

(2)

(1)

3.5.7	TYPE OF FOOTPRINT	TOE DEPTH (cm)
	Ape-like movement	6
	Human-like bipedalism	2.1 /2.2
	Laetoli	1.1/ 1.2

Criteria for marking the table.

Criteria	Mark allocation
Correct table format (T)	1
(Separation of columns) / variables not swopped	
Column headings (H)	1
Data entered (E)	
1-2 data sets are entered correctly	1
All 3 data sets are entered correctly	2

(4) **[50]**

TOTAL SECTION B: 100

GRAND TOTAL: 150