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PREPARATORY EXAMINATION

GRADE 12

LIFE SCIENCES P2

SEPTEMBER 2022

MARKS: 150

MARKING GUIDELINES

These marking guidelines consist of 11 pages.

PRINCIPLES RELATED TO MARKING LIFE SCIENCES

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 the 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 the 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 the answer, if correct.
10. **Wrong numbering**
If the answer fits into the correct sequence of questions, but the wrong number is given, it is acceptable.
11. **If the 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 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 differently.**
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 learner's 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 applies to all official languages.
19. **Changes to the memorandum**
No changes must be made to the memoranda. The Provincial Internal Moderator must be consulted.

SECTION A

QUESTION 1

1.1	1.1.1	B ✓✓		
	1.1.2	C ✓✓		
	1.1.3	C ✓✓		
	1.1.4	A ✓✓		
	1.1.5	D ✓✓		
	1.1.6	A ✓✓		
	1.1.7	A ✓✓		
	1.1.8	D ✓✓		
	1.1.9	C ✓✓		
	1.1.10	C ✓✓	(10 x 2)	(20)
1.2	1.2.1	Gene ✓		
	1.2.2	Gametogenesis ✓		
	1.2.3	Phylogenetic ✓ tree		
	1.2.4	Dominant ✓		
	1.2.5	Biogeography ✓		
	1.2.6	Species ✓		
	1.2.7	Opposable thumb ✓		
	1.2.8	Theory ✓		
	1.2.9	Non-disjunction ✓		
	1.2.10	Incomplete ✓ dominance	(10 x 1)	(10)
1.3	1.3.1	Both A and B ✓✓		
	1.3.2	A only ✓✓		
	1.3.3	Both A and B ✓✓	(3 x 2)	(6)
1.4	1.4.1	Dihybrid cross ✓		(1)
	1.4.2	(a) bbnn ✓✓		(2)
		(b) Bitter ✓		(1)
		(c) BN Bn bN bn ✓✓		(2)
	1.4.3	bbNn is sweet with yellow spots ✓ Bbnn is bitter with no yellow spots ✓		(2) (8)
1.5.	1.5.1	(a) mRNA ✓		(1)
		(b) Peptide bond ✓		(1)
		(c) GAG ✓✓		(2)
	1.5.2	Ribosome ✓		(1)
	1.5.3	Uracil ✓		(1)
				(6)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 2.1.1 GTA ✓✓ (2)

2.1.2 Cysteine ✓ and Threonine ✓ (2)

2.1.3 **The process is translation** ✓*
The codon **UAU** ✓ of mRNA
was exposed on the ribosome ✓
The tRNA with the complementary anticodon **AUA** ✓
brought the amino acid **tyrosine** ✓
from the cytoplasm to the ribosome ✓
It was then bonded to the neighbouring/previous amino
acid by a peptide bond ✓
(✓* compulsory mark + any 4) (5)
(9)

**Credit compulsory mark and any 4 points in sequence
NB. No credit for generic description of translation
process if it does not relate to amino acid 11 in the
table.**

2.2 Structural difference between DNA and RNA

DNA	RNA
Deoxyribose sugar ✓	Ribose sugar ✓
Nitrogenous base Thymine ✓	Nitrogenous base Uracil ✓
Double stranded ✓	Single stranded ✓
Helix structure ✓	Straight molecule ✓

1 mark ✓ for table and any 2 x 2 (5)

Mark first TWO only

2.3 2.3.1 A diploid body cell ✓✓ (2)

2.3.2 It is a haploid cell ✓/Does not have the desired
characteristic (1)

2.3.3 - The diploid ✓ embryonic cell removed from an embryo
of sheep V
- multiplied by mitosis ✓
- Producing identical cells ✓
- The identical nuclei of the cells were removed and
implanted into empty ova ✓
- which developed into genetically identical embryos ✓
/lambs Any 4 (4)

2.3.4 The nucleus/genetic material originated from sheep V ✓/
the genetic material of sheep W was removed from the ova (1)

- 2.3.5 – Produce superior livestock ✓
– Produce livestock more rapidly ✓
– As market changes, livestock can be bred to respond to market changes and demands ✓
Mark first TWO only Any 2 (2)
- 2.3.6 – Against ethical/moral believes ✓
– It is not safe don't know what can happen to clone ✓/
unsure of long- term effects
– Against nature ✓
– Potential health impact ✓
– Expensive ✓ (1)
– Reduce genetic variation ✓ (11)
Mark first TWO only Any 1
- 2.4 2.4.1 – There are 3 different alleles ✓ that determines blood groups
– An individual only inherit two alleles. ✓ (2)
- 2.4.2 $I^A i$ ✓✓ (2)
- 2.4.3 – The baby's genotype is ii ✓/homozygous for the recessive allele
– The baby must inherit one allele for type O blood/ i from each parent ✓
– The father/Mr Wilson's genotype is AB and does not have the recessive/ i allele ✓ (3)
- 2.4.4 – Compare the DNA profiles of the daughter, mother and father ✓
– Identify the DNA bands of the daughter that are the same as that of the mother ✓
– All ✓ the remaining bands of the daughter must be the same as that of Mr Wilson ✓/the father (4)
(11)
- 2.5 – Males have one X – chromosome and one Y - chromosome on the gonosome ✓/ 23 chromosome pair
– Females have two X- chromoomes on the gonosomes ✓ / 23 chromosome pair
– All ova have an X- chromosome from the gonosome ✓
– If an ovum is fertilized by an X-chromosome bearing sperm a female/girl is formed ✓ (4)
– If an ovum is fertilized by a Y-chromosome bearing sperm a male/boy is formed ✓ Any 4

- 2.6 2.6.1 – The population of a single species of squirrels becomes separated by a geographical barrier, **(the river)** ✓*
- The population split into two populations. ✓
 - There was no gene flow between the two populations ✓
 - Since each population was exposed to different environmental conditions ✓/the selections pressure was different
 - natural selection occurred independently ✓ in each of the two populations
 - such that the individuals of the two populations became very different ✓ from each other
 - genotypically and phenotypically ✓
 - Even if the populations are to mix again ✓
 - they will not be able to interbreed ✓
 - The two populations are now different species

1 Compulsory mark + Any 6 (7)

- 2.6.2 – Breeding at different times of the year ✓
- Species-specific courtship behaviour ✓
 - Plant adaptations to different pollinators ✓
 - Infertile offspring ✓
 - Prevention of fertilisation ✓

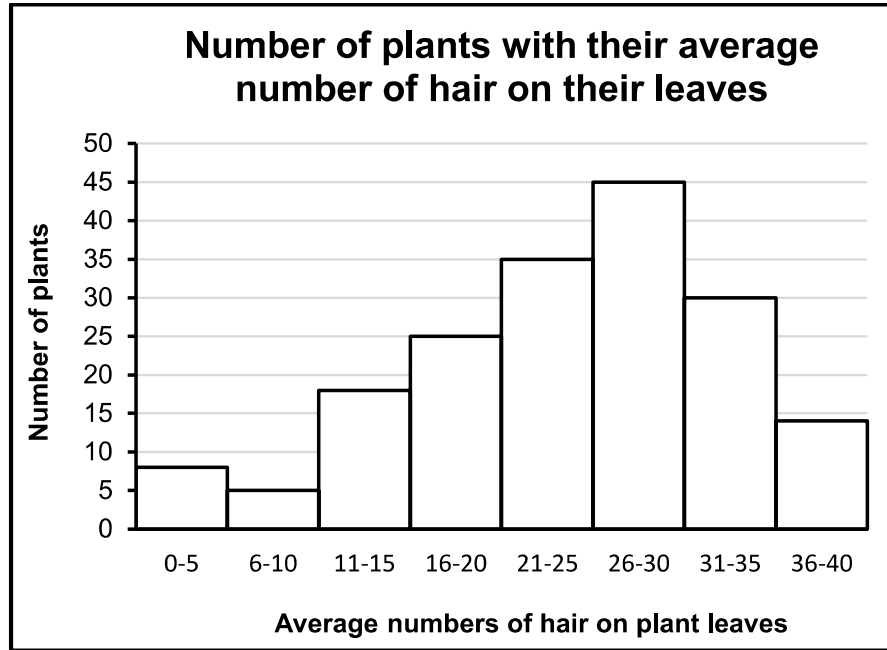
Mark first THREE only

Any 3 (3)
(10)
(50)

QUESTION 3

- 3.1 3.1.1 (a) A/B ✓ (**mark first one only**) (1)
- (b) C ✓ (1)
- (c) C ✓ (1)
- (d) A ✓ (1)
- 3.1.2 Large brain give rise to:
– Well-developed hand-eye coordination ✓
– Capacity of language ✓
– Improved intelligence ✓
– The ability to receive and process more stimuli from the environment ✓
– Better decision making ✓
Mark first TWO only Any 2 (2)
- 3.1.3 – Smaller cranium size ✓
– Brow ridges are well developed ✓
– Cranial ridges present ✓
– Larger jaws ✓
– Sloping face ✓
– Less developed chin ✓
Mark FIRST THREE only Any 3 (3)
- 3.1.4 Fossil evidence ✓ (2)
Genetic evidence ✓ (11)
- 3.2 3.2.1 (a) With OR without artificial selection ✓ (1)
- (b) Number of plants with more hairs on their leaves ✓ (1)
- 3.2.2 Repeat the investigation ✓
Increase the sample size ✓
Mark FIRST ONE only (1)
- 3.2.3 With artificial selection the number of plants with more hairs on their leaves increases ✓✓ (2)

3.2.4



	Mark Allocation
Correct type of graph (T)	1
Caption for graph with both variables (C)	1
Correct label for X-axis and label for Y-axis (L)	1
Correct scale for X-axis, scale for Y-axis and width of bars (S)	1
Plotting of points (P)	1 (1 to 7 points correct) 2 (All 8 points correct)
<p>Note: If the wrong graph is drawn, marks will be lost for 'correct type of graph' and correct scale. If axes are transposed, marks will be lost for labelling of X-axis and Y-axis.</p>	

(6)
(11)

- 3.3 3.3.1 Prophase II ✓ (1)
- 3.3.2 (a) B ✓ – chromosome ✓ (2)
- (b) E ✓ – centromere ✓ (2)
- 3.3.3 (a) 4 ✓ (1)
- (b) 2 ✓ (1)
- (7)**

3.4 3.4.1 (a) Unaffected male ✓ (1)

(b) X^dY ✓ (1)

3.4.2 The recessive alleles are only carried on the X chromosome of the gonosome ✓ / 23 chromosome pair (1)

3.4.3

- Colour blindness is carried by a recessive allele ✓
- On the X-chromosome of the gonosome ✓
- Females have two X chromosomes on the gonosome ✓
- 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 (4)

3.4.4 P₁

Phenotype : Colour blind female x Unaffected male ✓

Genotype : X^dX^d x X^DY ✓

Meiosis

G/gametes X^d, X^d X^D, Y ✓

Fertilization



F₁ Genotype X^DX^d X^dY X^DX^d X^dY ✓

Phenotype 1 normal daughter : 1 colour blind son ✓

50% chance of having a colour blind son ✓*

P₁ and F₁ ✓

Meiosis and fertilization ✓

(✓*Compulsory 1 + Any 5) (6)

OR

P₁

Phenotype: Colour blind female x Unaffected male ✓

Genotype: X^dX^d x X^DY ✓

Meiosis

Fertilization

Meiosis		
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 ✓		

F₁ Genotype X^DX^d X^dY X^DX^d X^dY

Phenotype 1 normal daughter : 1 colour blind son ✓

50% chance of having a colour blind son ✓*

P₁ and F₁ ✓

Meiosis and fertilization ✓

(✓***Compulsory** 1 + Any 5) (6)
(13)

- 3.5 3.5.1 – Predators may mistake it ✓/avoid eating them
 – because they resemble *A. ochlea* which has an unpleasant taste ✓ (2)

- 3.5.2 – There was a variation in the appearance and taste of butterflies ✓
 – The ***Amauris ochlea*** did have an unpleasant taste and the ***Hypolimnas deceptor*** that looks like the ***Amauris ochlea*** did not have an unpleasant taste ✓
 – Predators feed on butterflies in this habitat ✓
 – ***Hypolimnas deceptor*** that look like the ***Amauris ochlea*** with the unpleasant taste were avoided by predators ✓ / predators did not prey on them
 – they were mistaken by their appearance for unpleasant taste ✓
 – the ***Hypolimnas deceptor*** survive ✓
 – They reproduced and ✓ (6)
 – Passed the allele of appearance/allele of looking similar to ***A. ochlea*** to the offsprings ✓ (8)
 – More ***H deceptor*** butterflies is in the next generation that look like ***A ochlea***. ✓ [50]

Any 6

TOTAL SECTION B: 100
GRAND TOTAL: 150