GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

GAUTENG DEPARTMENT OF EDUCATION

PREPARATORY EXAMINATION

2021

MARKING GUIDELINES

LIFE SCIENCES (PAPER 2) (10832)

12 pages

PRINCIPLES RELATING TO THE MARKING OF LIFE SCIENCES

1. **If more information than marks allocated is given**
   Stop marking when maximum marks are reached and place a wavy line and 'max' in the right-hand margin.

2. **If, for example, three reasons are required and five are given**
   Mark only 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. **Changes to the marking guidelines**
No changes must be made to the marking guidelines without consulting the provincial internal moderator.

SECTION A

QUESTION 1

1.1	1.1.1	C✓✓		
	1.1.2	D✓✓		
	1.1.3	D✓✓		
	1.1.4	C✓✓		
	1.1.5	D✓✓		
	1.1.6	B✓✓		
	1.1.7	D✓✓		
	1.1.8	B✓✓		
	1.1.9	A✓✓		
	1.1.10	C✓✓	(10 x 2)	**(20)**
1.2	1.2.1	Cytokinesis✓		
	1.2.2	Translation ✓		
	1.2.3	Sperm✓ cells		
	1.2.4	Nucleotides✓		
	1.2.5	Karyotype ✓		
	1.2.6	Biotechnology✓	(6 x 1)	**(6)**
1.3	1.3.1	Both A and B✓✓		
	1.3.2	None ✓✓		
	1.3.3	A only ✓✓	(3 x 2)	**(6)**

1.4	1.4.1	(a)	Peptide✓ bond	(1)
		(b)	Nucleus✓	(1)
		(c)	DNA✓	(1)
		(d)	tRNA✓	(1)
	1.4.2	Strand 2✓		(1)
	1.4.3	CAT✓		(1)
	1.4.4	(a)	deoxyribose✓	(1)
		(b)	ribose✓	(1)
		(c)	two✓	(1)
		(d)	one✓	(1)
				(10)
1.5	1.5.1	Involves the inheritance of two characteristics✓✓		(2)
	1.5.2	BbHh✓		(1)
	1.5.3	(a)	bbHh✓	(1)
		(b)	Black and hornless✓	(1)
	1.5.4	(a)	½ ✓	(1)
		(b)	¼ ✓	(1)
	1.5.5	25%✓		(1)
				(8)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

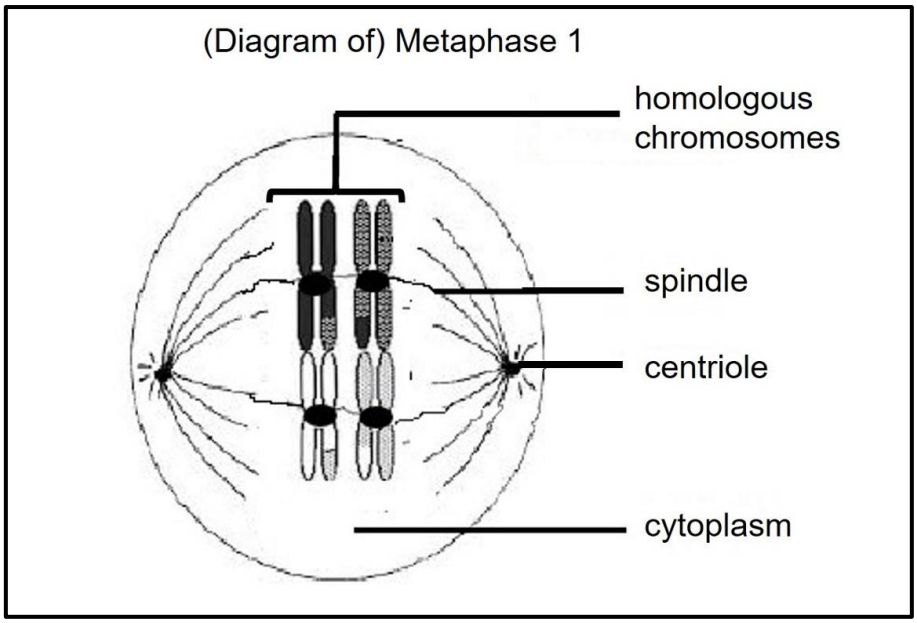
2.1 2.1.1 Anaphase 1✓ (1)

2.1.2 - Whole chromosomes✓ are pulled away
- from the equator towards the poles✓
(Mark first TWO only.) (2)

2.1.3 (a) Cell membrane✓/plasmalemma (1)
(b) Centromere✓ (1)

2.1.4 2✓ (1)

2.1.5



Criteria to assess the diagram

Correct caption	**(C)**	1
Diagram drawn correctly showing homologous pairs at the equator	**(D)**	1
Any THREE correct labels	**(L)**	3

(5)

2.1.6 – random fertilization ✓ of gametes
– random mating✓
– mutations✓
(Mark first TWO only.) Any 2 (2)
(12)

2.2 – When a gamete/sperm cell with 24 chromosomes✓/an extra chromosome of pair 21
– fertilises a **normal ovum**✓/gamete/ovum with 23 chromosomes
– the zygote will have three chromosomes at position 21✓/47 chromosomes, leading to Down Syndrome **(3)**

2.3 2.3.1 Complete dominance ✓ (1)

2.3.2 (a) Phenotype✓ (1)
(b) Number of (fruit) flies✓ (1)

2.3.3 They needed to:
- Find a source of fruit flies✓
- Research how to keep fruit flies alive for the investigation✓
- Decide on the sample size✓to be used
- Decide on what method✓ to use when gathering results
- Design a data capture tool✓/table

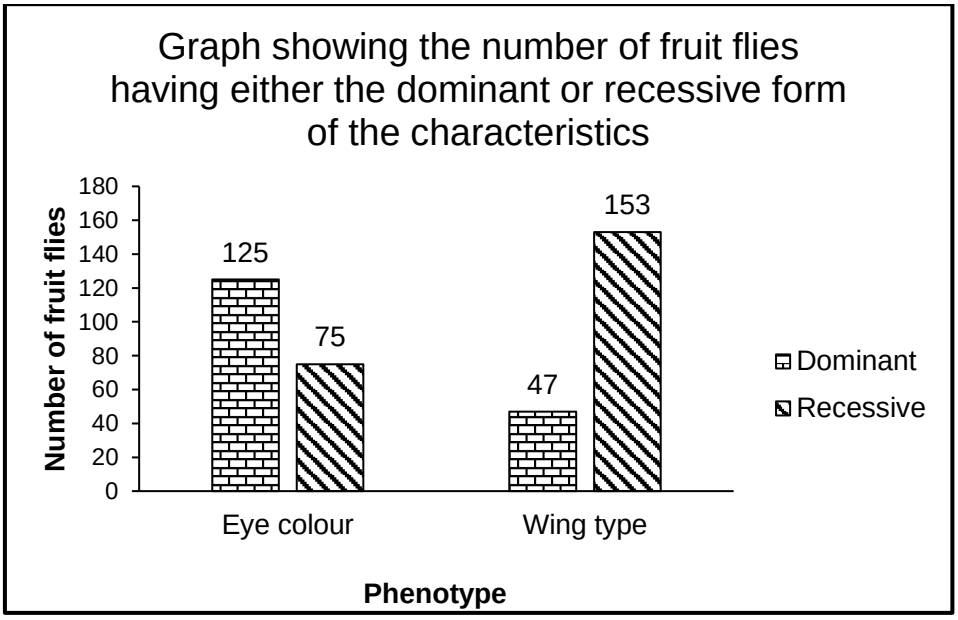
(Mark first THREE only.) Any 3 (3)

2.3.4
- Repeat✓ the investigation
- Use a larger sample size✓/more fruit flies

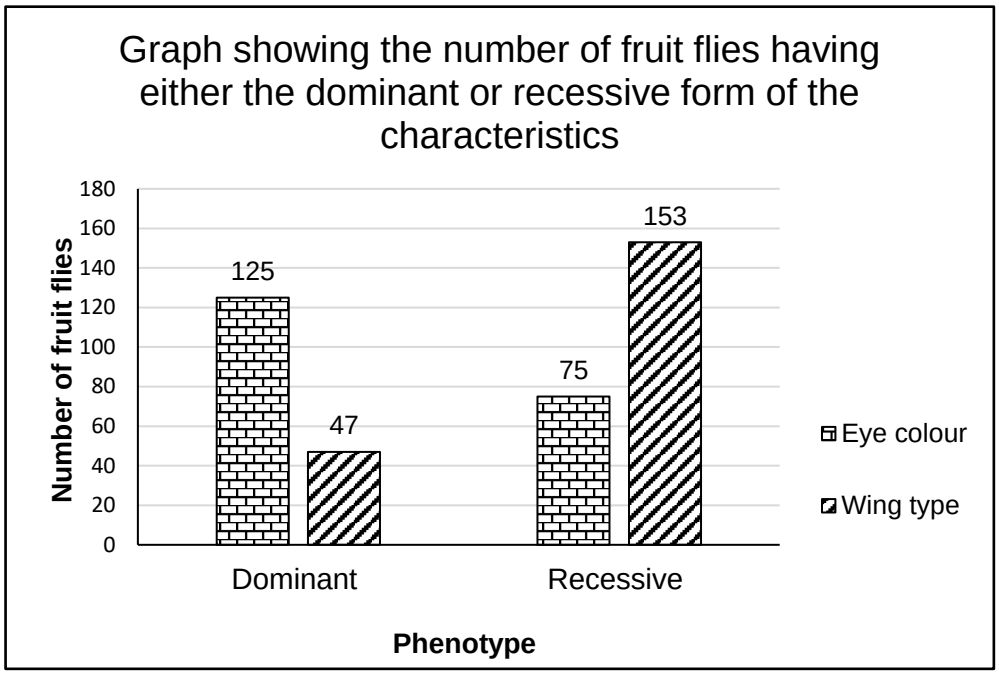
(Mark first TWO only.) (2)

2.3.5 More fruit flies have the dominant phenotype for eye colour/red eyes, than the recessive phenotype/white eyes.✓
Whereas more fruit flies have the recessive phenotype for wing type/ vestigial wings, than the dominant phenotype/normal wings.✓ (2)

2.3.6



OR



Guideline for assessing the graph:

Bar graph drawn	**(T)**	1
Title of the graph includes both variables	**(C)**	1
Correct label for X-axis Correct label for Y-axis	**(L)**	1
Equal width and interval of bars Correct scale for Y-axis	**(S)**	1
Drawing of bars:	**(D)**	1: 1 to 3 bars correctly drawn 2: All 4 bars correctly drawn

(6)

(16)

2.4 2.4.1 2✓/two (1)

2.4.2 male ✓with Duchenne muscular dystrophy✓/DMD /affected (2)

2.4.3 X^DX^d✓ (1)

2.4.4

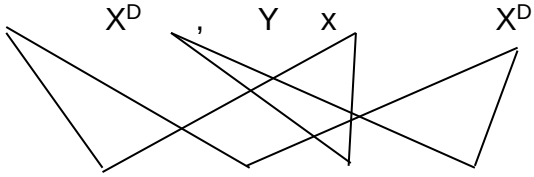
P_1 Phenotype Normal male x Normal female✓

Genotype X^DY x X^DX^d ✓

Meiosis

gametes X^D , Y x X^D , X^d ✓

Fertilization



F_1 Genotype $X^D X^D$: X^DX^d : X^DY : X^dY✓

Phenotype **3** normal/unaffected : **1** with Duchene muscular dystrophy✓/DMD/affected

There is a 25% chance✓* of offspring having Duchene muscular dystrophy /DMD

P_1 and F_1✓

Meiosis and fertilization ✓

1 compulsory* + Any 5

OR

Phenotype Normal male x Normal female✓

Genotype X^DY x X^DX^d ✓

Meiosis

Fertilization

Gametes	X^D	Y
X^D	$X^D X^D$	X^DY
X^d	X^DX^d	X^dY

1 mark for correct gametes✓

1 mark for correct genotypes✓

F_1 Phenotype **3** normal/unaffected : **1** with Duchene muscular dystrophy✓/DMD/affected

There is a 25% chance✓* of offspring having Duchene muscular dystrophy /DMD

P_1 and F_1✓

Meiosis and fertilization✓

1 compulsory* + Any 5

(6)

(10)

2.5 2.5.1 DNA replication✓ (1)

2.5.2 Hydrogen ✓bonds (1)

2.5.3 Interphase✓ (1)

2.5.4
- Doubles the genetic material✓
- Keeps chromosome number constant✓
- Creates genetically identical daughter cells✓

(Mark first TWO only.) Any 2 (2)
(5)

2.6 2.6.1 I^A; I^B and i ✓ (1)

2.6.2 2✓ (1)

2.6.3
- Even if the blood group of the possible father matches the child's blood group✓,
- it is not conclusive as other men may have the same blood group✓ as the possible father. (2)

(4)
[50]

QUESTION 3

3.1

Artificial selection	Natural selection
humans select a desired characteristic ✓/ humans represent the selective force	nature selects the desired characteristic ✓/the environment or nature is the selective force
human needs are fulfilled✓	the characteristic improves chances of survival ✓
humans select organisms to breed ✓	mating is random ✓
the characteristics of the population do not necessarily change✓	the characteristics of the population change✓
may involve more than one species✓	occurs within a species✓

(Mark first THREE only.) Any (3 x 2) + 1 Table **(7)**

3.2
- Evolution involves long periods of time where species do not change/or change gradually through natural selection as shown by **A**.✓✓
- These alternate with/are punctuated by short periods of time where rapid changes occur through natural selection as shown by **B**.✓✓ **(4)**

3.3 3.3.1 A group of organisms of the same species✓ found in the same habitat at the same time.✓ (2)

3.3.2
- The ancestral population of squirrels became separated into two populations✓
- by a a deep valley✓ /geographical barrier.
- The two populations could not interbreed✓/there was no gene flow between the two.
- Natural selection occurred independently in each population✓
- due to different environmental conditions on either side of the barrier✓
- The two populations became genotypically and phenotypically✓
- different✓ from each other.
- Even if the geographical barrier is removed, the squirrels will not be able to interbreed✓/produce fertile offspring.
- Two separate species have formed Any 6 (6)

3.3.3
- Breeding at different times of the year✓
- Species-specific courtship behaviour✓
- Plant adaptation to different pollinators✓
- Infertile offspring✓
- Prevention of fertilization✓

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

(10)

3.4
- There was variation in the frog population.✓
- Some of the frogs were light in colour and some of the frogs were dark in colour.✓
- Those that were light in colour were not camouflaged/ were more visible and were eaten by the heron✓/did not survive.
- Those that were dark in colour, were camouflaged/were less visible and survived✓/ were not eaten by the heron.
- The frogs that survived, reproduced✓
- and passed on the allele for dark colour to their offspring,✓
- leading to the population of dark coloured frogs✓ after four years.
- Any 6 **(6)**

3.5 3.5.1 **B C A** ✓✓ (2)

3.5.2
- The cranium of skull **A** is larger✓
- than the cranium of skull **C**✓
- indicating an increase in brain capacity✓/intelligence
-

OR

- The cranium of skull **C** is smaller✓
- than the cranium of skull **A**✓
- indicating a reduced brain capacity✓/intelligence (3)

3.5.3
- Skull A is less prognathous✓/less protruding jaw than skull B✓
- Skull A has a well-defined chin✓ whereas skull B does not✓
- Skull A has a smaller jaw✓ whereas Skull B has a large jaw✓

(Mark first TWO only.) Any (2 x 2) (4)
(9)

3.6 3.6.1 Quadrupedal✓ (1)

3.6.2
- The foramen magnum is in a forward position✓
- To allow the spinal cord to enter vertically✓
- The spine is more curved✓/S-shaped
- To absorb shock✓/allow flexible movement/for support
- The pelvis is short and wide✓/broad to support the upper body✓ in an upright position (6)

3.6.3
- *Homo sapiens*✓
- *Homo habilis*✓
- *Homo erectus*✓
- *Homo naledi*✓
- *Australopithecus spp (afarensis, africanus, sediba)*✓

(Mark first TWO only.) Any 2 (2)
(9)

3.7 3.7.1 **A**✓ (1)

3.7.2 6 million years ago✓/mya (1)

3.7.3
- Freely rotating arms✓
- Long upper arms✓
- Rotation around elbow joints✓
- Bare fingertips✓/ nails instead of claws
- Opposable thumb✓

(Mark First THREE Only.) Any 3 (3)
(5)
[50]

TOTAL SECTION B: 100

TOTAL: 150