

basic education

Department: Basic Education **REPUBLIC OF SOUTH AFRICA**

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P2

NOVEMBER 2024 MARKING GUIDELINES - FINAL (25/11/2024)

MARKS: 150

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These marking guidelines consist of 11 pages.



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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 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.

If flow charts are given instead of descriptions

- 7. 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 the 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 was accepted at the national standardisation meeting.

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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. The 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 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 is applicable to all official languages.

19. Changes to the marking guideline

No changes must be made to the marking guidelines. The provincial internal moderator must be consulted, who in turn will consult with the national internal moderator (and the Umalusi moderators where necessary).

20. Official marking guidelines

Only marking guidelines bearing the signatures of the national internal moderator and the Umalusi moderators and distributed by the National Department of Basic Education via the provinces must be used.









SECTION A

QUESTION 1

1.1	1.1.1 1.1.2 1.1.3 1.1.4 1.1.5 1.1.6 1.1.7 1.1.8 1.1.9	$ \begin{array}{c} A\checkmark\checkmark\\ C\checkmark\checkmark\\ C\checkmark\checkmark\\ B\checkmark\checkmark\\ D\checkmark\checkmark\\ B\checkmark\checkmark\\ D\checkmark\checkmark\\ C\checkmark\checkmark\\ C\checkmark\checkmark\\ C\checkmark\checkmark $	(10 × 2)	(20)
1.2	1.1.10 1.2.1 1.2.2 1.2.3 1.2.4 1.2.5 1.2.6 1.2.7 1.2.8 1.2.9	Deoxyribonucleic acid \checkmark /DNA Haploid \checkmark Centromere \checkmark transfer RNA \checkmark /tRNA DNA profiling \checkmark Karyotype \checkmark /karyogram Species \checkmark Metaphase I \checkmark /1 Cloning \checkmark	(10 x 2) (9 x 1)	(20)
1.3	1.3.1 1.3.2 1.3.3	Both A and B✓✓ A only✓✓ Both A and B✓✓	(3 x 2)	(6)
1.4	1.4.1	 (a) (DNA) replication√ (b) Hydrogen√bond 		(1) (1)
	1.4.2	(a) Nucleotide✓ (b) Thymine✓		(1) (1)
	1.4.3	Interphase ✓		(1)
	1.4.4	Nucleus✓		(1) (6)
1.5	1.5.1	Dihybrid√ cross		(1)
	1.5.2	Red spots ✓ and black eyes ✓		(2)
	1.5.3	(a) RRee✓✓ and Rree✓✓		(4)
		(b) Red spots, black eyes ✓		(1)
		(c) re✓		(1) (9)







TOTAL SECTION A: 50 Please turn over

SECTION B

QUESTION 2

2.1	2.1.1	mRNA√/messenger RNA	(1)
	2.1.2	 The DNA double helix unwinds ✓ and (the double strand) unzips √/(weak) hydrogen bonds break to form two separate strands ✓ One strand is used as a template ✓ to form mRNA ✓ using free RNA nucleotides ✓ from the nucleoplasm The mRNA is complementary to the DNA ✓ / A complements U, G complements C Any 	(6)
	2.1.3	 Molecule X (DNA) is double stranded√(double helix) Molecule Y (RNA) is single stranded√ OR Molecule X (DNA) has H-bonds√ 	
		- Molecule Y (RNA) has no H-bonds✓ OR	
		 Molecule X (DNA) contains deoxyribose√sugar Molecule Y (RNA) contains ribose√sugar OR 	
		 Molecule X (DNA) has thymine √/T as a nitrogenous base Molecule Y (RNA) has uracil √/U as a nitrogenous base 	
		- Molecule X (DNA) is longer√	
		 Molecule Y (RNA) is shorter ✓ (Mark first ONE only) Any (1 x 2) 	(2)
	2.1.4	TAC✓	(1)
	2.1.5	 Arginine√ Proline√ 	(2)
			(12)
2.2	2.2.1	Anaphase II✓	(1)
	2.2.2	 Chromosome pairs separate during Anaphase I√/ chromosomes move to the poles A chromosome separates during Anaphase II√/chromatids move to the poles 	
		 Centromeres do not split during Anaphase I√ Centromeres split during Anaphase II√ (Mark first ONE only) 	(2)
	2.2.2	(a) Contrible (/contropome	(-)
	2.2.3	(a) Centrole*/centrosome	(1)
		(b) Spindle fibre✓	(1)





2.2.4 - Attaches to the centromere ✓

- to pull chromatids/chromosomes towards the (opposite) poles ✓
 OR
 - it contracts ✓/shortens
 - to pull chromatids/chromosomes towards the (opposite) poles \checkmark (2)

2.2.5

Diagram showing metaphase II



Guideline for assessing the drawing

Criteria		Marks
Position: chromosomes in a single row at the equator	(P)	1
Number: 2 unpaired chromosomes drawn	(N)	1
Shading of chromosomes	(S)	1
1 shaded chromosome with an unshaded tip		
1 unshaded chromosome with a shaded tip		
Any TWO correct labels	(L)	2
(except centriole & spindle fibre)		

- 2.3 2.3.1 O√
 - 2.3.2 Complete ✓ dominance
 - 2.3.3 The man is heterozygous ✓ /is I^Ai for blood group A
 - The woman has an allele for blood group $B^{\checkmark/is}$ I^AI^B
 - The child inherits the I^B allele from the mother \checkmark
 - and the i allele from the father√
 - Therefore, the child will be heterozygous ✓ for blood group B/ the genotype will be I^Bi

(5)

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(5) (**12)**

- (1)
- (1)



Guideline for assessing the graph

CRITERIA		ELABORATION	MARK
Correct type of graph	(T)	Bar graph drawn	
Caption of graph	(C)	Both variables, SA and 2018 included	1
Axes labels	(L)	X- and Y axis correctly labelled with units	1
Scale for X- and Y-axis	(S)	- Equal space and width of bars for	
		X-axis and	1
		 Correct scale for Y-axis 	
Plotting of co-ordinates	(P)	- 1 to 3 co-ordinates plotted correctly	1
-		- All 4 co-ordinates plotted correctly	2

Histogram or line graph drawn

- Lose marks for type of graph and for scale

Transposed axes:

- Can get full credit, if axes labels are also swapped and bars are horizontal
- If labels are *not* corresponding, then lose marks for labels and scale
- Check that the plotting is correct for the given labels

2.4 2.4.1 Three√/3

- 2.4.2 (a) Male without muscular dystrophy√
 - (b) X^DX^d✓

2.4.3 - Males only have one X chromosome \sqrt{XY} and

- need only one recessive allele to have muscular dystrophy√

- The X^d allele on a male cannot be masked by a dominant allele \checkmark
- Females have two X-chromosomes ✓ and
- need two recessive alleles to have muscular dystrophy√/ X^dX^d
- In females, a dominant allele on one X chromosome would mask the effect of the recessive allele √/X^D masks X^d
 Any (4)





(6)

(1)

(1)

(1)

(13)

8 NSC – Marking Guidelines

2.4.4	P ₂	Phenotype	Female without muscular dystrophy	Male without muscular X dystrophy✓			
	Meiosis	Genotype	X^DX^d	x X ^D Y√			
		Gametes	X ^D , X ^d	x X ^D , Y✓			
	Fertilisation						
	F ₂	Genotype	X ^D X ^D X ^D Y	X ^D X ^d , X ^d Y ✓			
		Phenotype	 (50%) females without muscular dystrophy (25%) male without muscular dystrophy (25%) male with muscular dystrophy 				
	P_2 and $F_2 \checkmark$		25√*% chance of m	nuscular dystrophy child			
	Meiosis and fertilisation✓						
			*1 com	pulsory mark + Any 5			
			OR				
	P ₂	Phenotype	Female without muscular dystrophy	Male without muscular x dystrophy√			
		Genotype	$X^{D}X^{d}$	x X ^D Y√			
	Meiosis						
	Fertilisation			X ^D X ^d X ^D X ^D X ^d			
			Y	X ^D Y X ^d Y			
			1 mark for correct 1 mark for correct	gametes genotypes			
	F ₂	Phenotype	(50%) females with (25%) male withou (25%) male with m	nout muscular dystrophy t muscular dystrophy uscular dystrophy			
	P_2 and $F_2 \checkmark$		25√*% chance of	nuscular dystrophy child			
	Meiosis and f	ertilisation√	*1 c	ompulsory mark + Any 5			





(6) (13) [50]

QUESTION 3

3.1	3.1.1	 The Bt producing gene is cut from the bacterial DNA√ and inserted into maize DNA√ This recombinant DNA√ 			
		- causes the maize plant to produce the Bt toxin√ Any	(3)		
	3.1.2	 Fewer crops damaged ✓ leads to increased yield ✓/more food for people/increased food security/healthier crops/more profit Reduced need for pesticides, ✓ farmers save money ✓/less toxins to consumers/environment 			
		(Mark first TWO only) (2 x 2)	(4) (7)		
3.2	3.2.1	\bigvee	(1)		
	3.2.2	Gibbons√/U	(1)		
	3.2.3	For gibbons at 3.2.2 They share the most recent common ancestor U✓ OR			
		<u>For 'U' at 3.2.2</u> Old-world monkeys are directly descended from U✓	(1)		
	3.2.4	Humans✓ Chimpanzees✓ Gorillas✓ Q✓ Any (Mark first THREE only)	(3)		
	3.2.5	 (Freely) rotating arms√ Long upper arms√ Rotation around the elbow joints√ Rotation around the wrist√ Bare fingertips√ Nails instead of claws√ Have fingerprints√ Opposable thumb√/Precision grip Five digits per limb√/Pentadactyl hand Any 	(3)		
		(WARK TIRST I HKEE)	(9)		
3.3	3.3.1	(a) Type of milk✓	(1)		
		(b) Height√ of children	(1)		

(b) Height ✓ of children





10 NSC - Marking Guidelines

Any

(2)

(3)

(2) (12)

(1)

- 3.3.2 Continuous ✓ (variation)
- 3.3.3 Ensure the same additional diet \checkmark
 - Ensure similar daily activities ✓ _
 - Ensure similar living conditions√ -
 - Date ✓ /time/ venue for measurement
 - Decide on the sample size ✓
 - Ask for parental consent√
 - Train the research assistants√
 - Recruit parents that are willing to participate \checkmark
 - Decide on the target group \checkmark
 - Design the recording sheet ✓
 - Decide on the source of milk \checkmark
 - Select apparatus ✓ /equipment/decide on method measurement
 - Decide on duration ✓ of investigation
 - Choosing the type of milk√ -
 - Decide on the amount of milk√

(Mark first TWO only)

- 3.3.4 Only healthy children ✓ chosen
 - Same:
 - age√
 - race√
 - gender√
 - quantity of milk√
 - additional diet√
 - supplier of milk√
 - number of children in each group√
 - duration√

Similar:

- daily activities ✓
 - living (environmental) conditions√ Any

(Mark first THREE only)

- 3.3.5 -Genetic/hormonal influence was not considered ✓
 - Difficult to maintain the same conditions over a 7-year period \checkmark
 - Not measuring the baseline height \checkmark (1) Anv

(Mark first ONE only)

- 3.3.6 2 073 children in each group ✓ participated
 - 4 146 children divided into two equal groups ✓ participated -
 - Investigation conducted over 7 years√ (1) Any
- 3.3.7 Cow milk consumption leads to better growth/increased height compared to soy milk $\checkmark \checkmark$

OR

Soy milk consumption by children leads to decreased height $\checkmark \checkmark /$ below average height

OR

Cow-milk consumption by children leads to increased height $\checkmark \checkmark /$ above average height



Life Sciences/P2		11 NSC – Marking Guidelin	DBE/November 2024 es	
3.4	3.4.1	 The oldest fossils of <i>Homo erectus</i> were found in Africa√, while the younger fossils were found in other parts of the world√/Asia indicating that <i>Homo erectus</i> migrated out of Africa√ 		
	3.4.2	 Ardipithecus fossils were foun Australopithecus fossils were fe Fossils of Homo habilis were fe The oldest fossils of Homo sap The younger fossils of Homo sap of the world√ 	d in Africa only√ ound in Africa only√ ound in Africa only√ oiens were found in Africa√ sapiens were found in other parts Any	(4)
	343	Homo erectus	Homo sapiens	
		Small brain√	Large brain√	
		Prominent brow ridges√	Reduced brow ridges✓	
		(Mark first TWO)	(2 x 2) + (1) table ✓	(5)
	3.4.4	The foramen magnum was in a (m	nore) forward position \checkmark	(1) (13)
3.5	3.5.1	Changes in the genetic composition	on√ of organisms	(1)
	3.5.2	Leads to cancer√/death/mutations	3	(1)
	3.5.3	 There was variation amongst (i Some had the mutation which n some did not√ When exposed to radiation√ the wolves without the mutation Those with the mutation/ immu and reproduced√ passing the allele for the mutat The next generation had a hig mutation√/immunity to cancer 	the population of) the wolves√ nade them immune to cancer and n/immunity died√ nity survived√ ion/ immunity to their offspring√ her proportion of wolves with the Any	(7) (9) [50]

- TOTAL SECTION B: 100
 - **GRAND TOTAL:** 150







