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Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

**LIFE SCIENCES P2
SEPTEMBER 2024
MEMO**

MARKS: 148

These marking guidelines consist of 13 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 whole process is given when only part of it is required** Read all and credit relevant part.
4. **If comparisons are asked for but 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 unrecognized 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 given in terminology**
Accept, provided it was accepted at the National memo discussion meeting.
14. **If only letter is asked for and only 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 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. 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 | A✓✓ | |
| | 1.1.3 | C✓✓ | |
| | 1.1.4 | D✓✓ | |
| | 1.1.5 | D✓✓ | |
| | 1.1.6 | A✓✓ | |
| | 1.1.7 | D✓✓ | |
| | 1.1.8 | C✓✓ | |
| | 1.1.9 | C✓✓ | (9 x 2) (18) |
| 1.2 | 1.2.1 | Stereoscopic✓/Binocular vision | |
| | 1.2.2 | Nucleotides✓ | |
| | 1.2.3 | Punctuated equilibrium✓ | |
| | 1.2.4 | Interphase✓ | |
| | 1.2.5 | Discontinuous✓ (variation) | |
| | 1.2.6 | Hominins✓ | |
| | 1.2.7 | Stem cells✓ | |
| | 1.2.8 | Sex-linked✓ (characteristics) | |
| | 1.2.9 | Cloning✓ | (9 x 1) (9) |
| 1.3 | 1.3.1 | A only✓✓ | |
| | 1.3.2 | Both A and B✓✓ | |
| | 1.3.3 | B only✓✓ | (3 x 2) (6) |
| 1.4 | 1.4.1 | 3✓ | (1) |
| | 1.4.2 | The 2/3 DNA bands/black bars on the DNA profile of male 2/3✓
match with the 3 bands on the profile of the girl✓ | (2) |
| | 1.4.3 | - Identify suspects of crime✓
- Determine the probability or causes of genetic defects✓/identify
the cures for genetic disorders
- Establish the compatibility of tissue types for organ transplants✓
- Identify missing relatives
- To identify dead bodies✓ | Any (2) |
| | | (Mark the first TWO only) | (5) |

- | | | | |
|-----|-------|---|----------------------------------|
| 1.5 | 1.5.1 | Natural selection✓ | (1) |
| | 1.5.2 | (a) (Different) doses of antibiotic✓
(b) Number of harmful bacteria✓ | (1)
(1) |
| | 1.5.3 | Higher doses of antibiotic✓ results in lower number of harmful bacteria✓ | |
| | | OR
Lower doses of antibiotic ✓ result in higher number of numbers of bacteria✓ | (2) |
| | 1.5.4 | It decreases the number of harmful bacteria✓ the most thereby preventing diseases in the cattle✓/resulting in less medical expenses. | |
| | | OR
Decreasing mortality of cattle✓ by maintaining the number of cattle to sell✓/breed/make profit
(Mark first ONE only) | Any (1 x 2)
(2)
(7) |
| 1.6 | 1.6.1 | (a) Affected✓ female
(b) Aa✓
(c) aa✓ | (1)
(1)
(1) |
| | 1.6.2 | They have an affected son/a son with albinism/son with aa genotype who had inherited one recessive allele from each of the parents✓ | |
| | | OR
Both Bob and Ann each have parents who are affected✓ and therefore inherited recessive alleles from each parent✓. | (2)
(5) |

TOTAL SECTION A: 50



SECTION B**QUESTION 2**

2.1 2.1.1 (a) Spindle fibre✓/spindle thread (1)

(b) Cell membrane✓ (1)

2.1.2 Anaphase II✓ (1)

2.1.3 The centromere splits/spindle fibres contract✓ and the (two) chromatids are pulled to opposite poles ✓ (2)

2.1.4 Metaphase II ✓ (1)

2.1.5 - Result in similar/same gametes✓
 - offspring of the same genotype and phenotype✓ being formed
 - reduced chance of survival/increased chance of extinction and
 - loss of biodiversity✓ Any (3)
(Mark first THREE only)

2.1.6 Four✓/4 (1)

2.1.5 T✓

Meiosis I	Meiosis II
Crossing over takes place✓	Crossing over does not take✓ place
Homologous chromosomes arrange at the equator in pairs✓	Chromosomes arrange at the equator singly✓
Whole chromosomes move to opposite poles of the cell✓	Chromatids move to opposite poles of the cell ✓
The chromosome number is halved from diploid to haploid✓	The chromosome number remains the same (haploid)✓
Results in two daughter cells✓	Results in four daughter cells✓

2 x 2 + 1 for table (5)
(15)



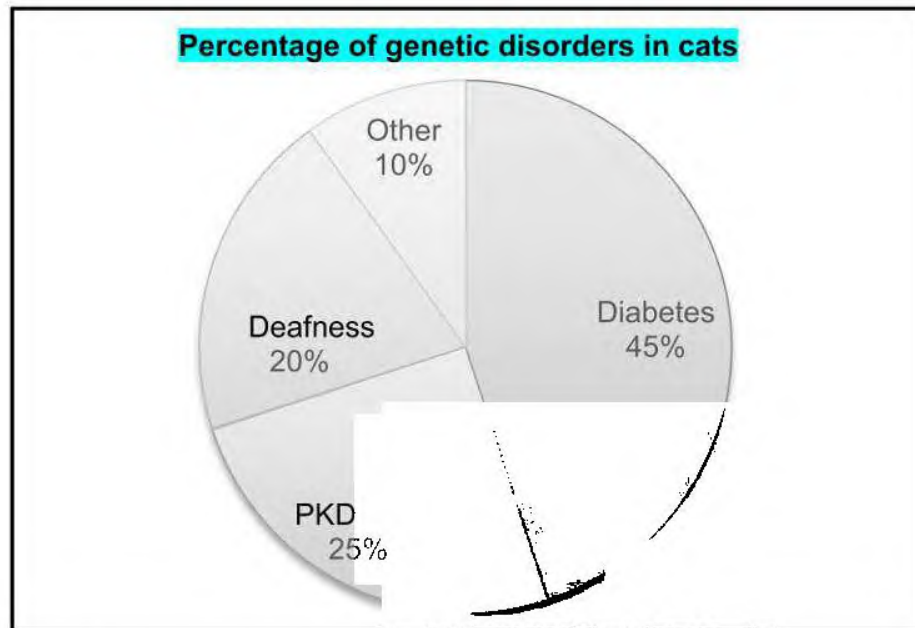
- 2.2 2.2.1 The changes/modifications brought about by the frequency of use or disuse✓ were transmitted/passed on to the offspring✓ (2)
- 2.2.2 Organisms do not evolve because they were determined/wanted to change/✓ but changes took place randomly due to mutations✓ (2)
- OR
- The characteristics acquired by an organism through use or disuse do not affect the organism's genetic makeup✓ therefore cannot be inherited✓
- OR
- There is no evidence ✓ to show that acquired characteristics are inherited ✓
- OR
- The characteristics acquired by an organism in its lifetime✓ cannot be inherited✓ (4)
- 2.3 2.3.1 There are THREE different allele that control inheritance of blood groups ✓✓ (2)
- 2.3.2 2 ✓ (1)
- 2.3.3 It is used to exclude a man from being a child's father✓✓ (2)
- OR
- To narrow down the possible fathers✓✓ (5)



2.4 2.4.1 The changes to the sequence✓ of nitrogenous bases in a DNA molecule✓ (2)

2.4.2 Used 200✓ cats (1)

2.4.3



Calculations:

Diabetes: $45/100 \times 360^\circ = 162^\circ$

PKD: $25/100 \times 360^\circ = 90^\circ$

Deafness: $20/100 \times 360^\circ = 72^\circ$

Other: $10/100 \times 360^\circ = 36^\circ$

✓✓

Rubric for marking the graph:

Criteria	Mark
Correct type of graph (T)	1
Caption/Heading with 2 variables (H)	1
Correct calculations (C)	2
Plotting (P)	1 – 3 correct slices: 1 All four correct slices: 2

(6)
(9)



- 2.5 2.5.1 (a) Transcription✓ (1)
- (b) Nucleus✓
- Mitochondrion✓
- Chloroplast✓ Any (2)
- (Mark the first TWO only)**
- (c) Adenine✓ (1)
- 2.5.2 - Each tRNA carries a specific amino acid✓
- When the anticodon on the tRNA✓
- matches the codon on the mRNA✓
- then tRNA brings the required amino acid✓ to the ribosome✓
- Amino acids become attached to each other by peptide bonds✓
- to form the required protein✓ Any (6)
- 2.5.3 GGU✓ (1)
- 2.5.4 -the anticodon will change to UAG✓ instead of UAC
- that will code for a different amino acid✓
- resulting into a change in the **(sequence)** of amino acids✓
- leading to a slightly different structure of protein ✓ Any (3)
- 2.5.5 Methionine✓ - glycine✓ - arginine✓ (in correct sequence) (3)
- (17)
- [50]



QUESTION 3

- 3.1 3.1.1 A group of organisms sharing the similar/ same characteristics✓
that are able to interbreed✓ to produce fertile✓ (3)
- 3.1.2 -The original population of shrubs became separated into three sub-
populations✓* by continental drift/ocean/water✓
- no gene flow amongst the (three) sub populations✓
- each population experienced different environmental
conditions✓
- and underwent natural selection independently✓
- the shrubs in each population became different✓
- genotypically and phenotypically✓
- Even if they were to mix again/cross pollinate ✓, they will not be able
interbreed✓/to produce fertile population of shrubs
- because they are now three different species✓* in South America,
Africa and Australia **2 compulsory** * + Any 5 (7)
- 3.1.3 - Species-specific courtship behavior✓
- Breeding at different times of the year✓
- Infertile offspring✓
- Adaptation to different pollinators✓
- Prevention of fertilization✓
(Mark the first TWO only)

Any (2)

(12)

- 3.2 3.2.1 M✓ (1)
- 3.2.2 Foramen magnum is in a (more) forward position✓✓ (2)
- 3.2.3 It is long✓ and narrow✓ (2)
- 3.2.4 Jaw of skull **K** is less prognathous/less protruding/non-prognathous✓, that of skull **L** is more prognathous/more protruding/prognathous✓
- The palate of skull **K** is short and semi-circular/more rounded✓, that of skull **L** is long and rectangular/U-shaped✓
- The canines of skull **K** is short✓/small, those of skull **L** is long✓/ large and pointed
- There are no spaces between the teeth/diastema in skull **K**✓, in skull **L** there are spaces between the teeth✓/diastema
(Mark the first TWO only) Any (2 x 2) (4)
(9)
- 3.3 3.3.1 Phylogenetic tree/cladogram✓ (1)
- 3.3.2 3,1 /3,0 mya✓ (1)
- 3.3.3 *Homo habilis*✓
Homo sapiens✓
Paranthropus robustus✓
Paranthropus boisei✓ Any (2)
- 3.3.4 Increase in brain size/bigger brain size✓✓ to allow for:
Increased intelligence ✓✓
storing and processing of large information✓✓
processing large information quickly✓✓ Any 1 x 2 (2)
- 3.3.5 **No answer**
- 3.3.6 The fossils of *Ardipithecus*, *Australopithecus* and *Homo habilis* are found in Africa **only**✓
The **oldest fossils** of *Homo erectus* and *Homo sapiens* are found in Africa✓and
the **youngest fossils** are found in other continents (Asia, Europe)✓
Any (2)
(10)



- 3.4 3.4.1 Two✓/2 (1)
- 3.4.2 BbEe✓, bbee ✓ (2)
- 3.4.3 (a) Brown fur with long ears✓✓ (2)
- (b) BE, Be, bE and be✓✓ (2)
- 3.4.4 Alleles of different genes segregate/move independently of each other✓into the gamete so that they appear on the gametes in different combinations✓ (2)
- OR**
- The various 'factors' controlling the different characteristics are separate entities✓, not influencing each other in any way, and sorting themselves out independently during gamete formation✓
- OR**
- A pair of alleles(factors) controlling a particular characteristic separate independently✓ and then recombine differently to form gametes✓. (9)
- 3.5 3.5.1 Neither of the alleles are dominant over each other✓.
An intermediate phenotype is obtained when both alleles are present✓ (2)
- OR**
- Neither one of the two alleles of a gene is dominant over the other✓, resulting in an intermediate phenotype in the heterozygous condition✓.
- 3.5.2 Individuals with genotype $H^N H^S$ /heterozygous genotype have a mild form of the disease. ✓✓. (2)



3.5.3	P ₁	Phenotype	Man with Mild hypercholesterolemia H ^N H ^S	x	Normal Woman ✓/ A woman without hypercholesterolemia H ^N H ^N ✓
		Genotype			
		Meiosis			
		Gametes			
		Fertilization			
	F ₁	Genotype			
		Phenotype	2 Normal individuals/without hypercholesterolemia: 2 Individuals with mild hypercholesterolemia ✓ 0% ✓ * chance for children with severe hypercholesterolemia		

P₁ and F₁ ✓

Meiosis and fertilization ✓

*1 compulsory mark + Any 5

OR

P ₁	Phenotype	Man with Mild hypercholesterolemia	x	Normal Woman ✓/ A woman without hypercholesterolemia									
	Genotype	H ^N H ^S	x	H ^N H ^N ✓									
	Meiosis												
	Fertilization	<table border="1"> <tr> <th>Gametes</th> <th>H^N</th> <th>H^S</th> </tr> <tr> <th>H^N</th> <td>H^NH^N</td> <td>H^NH^S</td> </tr> <tr> <th>H^S</th> <td>H^NH^S</td> <td>H^SH^S</td> </tr> </table>			Gametes	H ^N	H ^S	H ^N	H ^N H ^N	H ^N H ^S	H ^S	H ^N H ^S	H ^S H ^S
Gametes	H ^N	H ^S											
H ^N	H ^N H ^N	H ^N H ^S											
H ^S	H ^N H ^S	H ^S H ^S											

1 mark for correct gametes

1 mark for correct genotypes

F ₁	Phenotype	2 Normal individuals/without hypercholesterolemia: 2 Individuals with mild hypercholesterolemia ✓ 0% ✓ * chance for children with severe hypercholesterolemia
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P₁ and F₁ ✓

Meiosis and fertilization ✓

*1 compulsory mark + Any 5 (6)

[48]

TOTAL SECTION B: 98

GRAND TOTAL: 148