basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P2

NOVEMBER 2018

MARKING GUIDELINES

MARKS: 150

These marking guidelines consist of 9 pages.

SECTION A

QUESTION 1

1.1	1.1.1	C ✓✓		
	1.1.2	B✓✓		
	1.1.3	C✓✓		
	1.1.4	B✓✓		
	1.1.5	A✓✓		
	1.1.6	C✓✓		
	1.1.7	C✓✓		
	1.1.8	D✓✓		
	1.1.9	B✓✓	(9 x 2)	**(18)**
1.2	1.2.1	Hydrogen✓bonds		
	1.2.2	Genome✓		
	1.2.3	Cultural✓evidence		
	1.2.4	Speciation✓		
	1.2.5	Haemophilia✓		
	1.2.6	Foramen magnum✓		
	1.2.7	Alleles✓		
	1.2.8	Discontinuous✓variation		
	1.2.9	Gonosomes	(9 x 1)	**(9)**
1.3	1.3.1	A only✓✓		
	1.3.2	Both A and B✓✓		
	1.3.3	A only✓✓	(3 x 2)	**(6)**
1.4	1.4.1	D- Chromatid✓ E- Centromere✓		(2)
	1.4.2	23✓ pairs		(1)
	1.4.3	(a) E✓		(1)
		(b) C✓/B		(1)
	1.4.4	(a) Nucleus✓ Mitochondrion✓ **(Mark first TWO only)**		(2)
		(b) Double helix✓		(1)
		(c) (DNA) Replication✓		(1) **(9)**
1.5	1.5.1	Phylogenetic tree✓/ cladogram		(1)
	1.5.2	An exoskeleton✓		(1)
	1.5.3	(a) S✓		(1)
		(b) T✓		(1)
	1.5.4	(a) Trilobites✓ (b) Helmetids✓ (c) Tegopeltids✓ (d) Naraoids✓	**OR** (b) Tegopeltids✓ (c) Helmetids✓	(1) (1) (1) (1) **(8)**

TOTAL SECTION A: 50

QUESTION 2

2.1 2.1.1
- Due to non-disjunction✓/ Non-separation of a chromosome pair
- during Anaphase **I**✓
- Two chromosomes moved to the one pole✓ and
- none moved to the other pole✓ Any (3)

2.1.2
- Gamete **A** will have 24 chromosomes✓/an extra chromosome
- and when it fertilises a normal ovum✓/gamete with 23 chromosomes
- the zygote will have 3 chromosomes at position 21✓/ 47 chromosomes (3)

2.1.3 (a) Prophase **I**✓ (1)

(b)
- Adjacent chromatids of homologous chromosomes cross✓
- at a point called the chiasma✓
- There is an exchange of DNA segments✓/genetic material (3)

(c)
- Crossing over introduces genetic variation✓ in gametes
- Genetic variation may result in favourable characteristics✓
- that ensure a better chance of survival✓
- when environmental conditions change✓

OR

- Crossing over introduces genetic variation✓ in gametes
- Genetic variation may result in unfavourable
- characteristics✓
- that reduce the chance of survival✓
- when environmental conditions change✓ Any (3)

(13)

2.2 2.2.1
(a) Female without SCID✓ (1)
(b) Male with SCID✓ (1)
(c) X^DX^d✓✓ (2)

2.2.2
- He inherited the recessive allele✓ /X^d
- from the mother✓/individual 4 (2)

(6)

2.3 2.3.1 (a) It allows for the production of organisms with desired characteristics✓/ high average milk yield (1)
(Mark first ONE only)

(b)
- It reduces genetic variation✓ in offspring
- It results in no further genetic improvement✓
- It is expensive✓
- It may not be economical for commercial agriculture✓

(Mark first ONE only) Any (1)

2.3.2 LMJC 865 had a high average milk-production yield✓/ produced 78 litres per day/ had the desired characteristic (1)

2.3.3
- A diploid cell✓/ a cell with all the genetic information is needed
- An ovum is a haploid cell✓/ only contains half of the genetic information (2)

2.3.4
- The nucleus of an ovum is removed✓ and replaced with
- the nucleus of a somatic donor cell✓/ diploid donor cell
- The zygote is stimulated✓
- for mitosis✓ to occur
- The embryo is then placed into the uterus of an adult female✓

OR

- Plants may be cloned by vegetative reproduction✓/asexual reproduction /tissue culture/grafting
- A plant with the desired characteristics is selected✓
- A vegetative part of the "parent" plant structure is removed✓/(examples) and
- placed inside a growth medium✓/(examples)
- and allowed to grow✓ Any 4 (4)

(9)

2.4 2.4.1 Purple✓ (1)

2.4.2
- When purple-flowering plants and white-flowering plants are crossed ✓
- all the offspring have purple flowers✓ /have no white flowers (2)

2.4.3
- The two alleles for a characteristic✓
- separate during meiosis✓ so that
- each gamete contains only one allele✓ for that characteristic (3)

2.4.4

P_1	Phenotype	Purple	x	Purple✓	
	Genotype	Dd	x	Dd✓	
Meiosis					
	G/gametes	D, d	x	D, d✓	
Fertilisation					
F_1	Genotype	DD; Dd; Dd		dd✓	
	Phenotype	Purple : White✓*			

P_1 and
F_1✓
Meiosis and fertilisation✓

*Compulsory 1 + Any 5

OR

P_1	Phenotype	Purple	x	Purple✓
	Genotype	Dd	x	Dd✓

Meiosis

Fertilisation

Gametes	D	d
D	DD	Dd
d	Dd	dd

1 mark for correct gametes
1 mark for correct genotypes

F_1 Phenotype Purple: White✓*

P_1 and
F_1✓
Meiosis and fertilisation✓ (6)
(12)

*Compulsory 1 + Any 5 **[40]**

QUESTION 3

3.1 3.1.1
- The jaw is large in the chimpanzee✓and small in *Homo sapiens*✓
- The jaw/ palate is rectangular in the chimpanzee✓and rounded in *Homo sapiens*✓
- Large spaces between the teeth in the chimpanzee✓ and small/no spaces in *Homo sapiens*✓
- Large canines/teeth in the chimpanzee✓ and small canines/teeth in *Homo sapiens*✓ Any 1 x 2 (2)

(Mark first ONE only)

3.1.2
- The diet changed from eating raw food✓ in *Australopithecus*
- to a diet of cooked food✓ in *Homo sapiens* (2)

3.1.3 (a) A transitional species shows intermediate characteristics between two genera/species✓

OR

It has characteristics common to both the ancestor species and the species that follows✓ (1)

(b) The jaw is smaller than that of the chimpanzee but larger than that of *Homo sapiens*✓✓

OR

The canines/ teeth are smaller than those of the chimpanzee but larger than those of *Homo sapiens*✓✓

OR

The jaw/ palate shape is more rounded than that of the chimpanzee but less rounded than that of *Homo sapiens*✓✓
Any 1 x 2 (2)

(Mark first ONE only)

(7)

3.2 3.2.1
- The bright colour pattern is associated with being poisonous✓
- thus reducing predation✓ and
- improving the chances of survival✓ (3)

3.2.2
- There is variation in the colour of kingsnakes✓
- Some are bright in colour✓/resemble the coral snakes and
- the others are dull in colour✓
- Those with dull colours are killed✓ by predators
- Those with bright colours are not eaten✓
- so they survive✓and reproduce,
- passing on the allele for bright colour to the next generation✓

Any 6 (6)
(9)

3.3 3.3.1 1900✓ (1)

3.3.2 $\left\{\frac{80}{20}\right\}$✓ x 100✓ = 400✓%

OR

$\left\{\frac{(100-20)}{20}\right\}$✓ x 100✓ = 400✓% (3)

3.3.3 T✓

Natural selection	Artificial selection
The environment or nature is the selective force✓	Humans represent the selective force✓
Selection is in response to suitability to the environment✓	Selection is in response to satisfying human needs✓
Occurs within a species✓	May involve one or more species✓ (as in cross breeding)

1 for Table + Any 2 x 2 (5)
(Mark first TWO only) **(9)**

3.4 3.4.1
- They invade farm fields✓
- They outcompete the crop plants for space✓ Any (1)

3.4.2 (a) Type of herbicide ✓ (1)
(b) Time taken for development of resistance✓ (1)

3.4.3 (a) Dicloflop✓ (1)
(b) Trifluralin✓ (1)

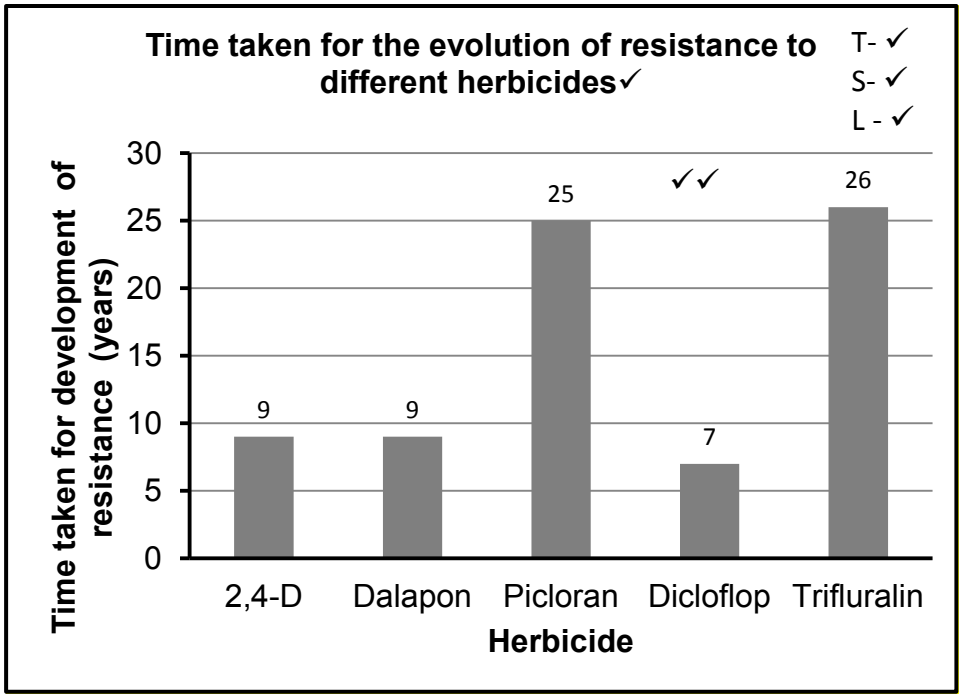
3.4.4 (a)
- They would apply the herbicide to the weed✓ and
- observe if the weed survives✓ over many generations (2)

(b)
- They used the same weed species as other weed species may have developed resistance to that herbicide✓
- Each weed species may respond differently✓ to a herbicide

OR

- It allows for a single variable✓
- to which all results can be attributed✓ (2)

3.4.5



Guideline for assessing the graph

Type: Bar graph drawn **(T)**	1
Title of graph	1
Correct: – **Scale** for Y-axis and **(S)** – Width and interval of bars on X-axis	1
Correct: – **Label** for X-axis and – **Label** and unit for Y-axis **(L)**	1
Plotting of bars	1- 1 to 4 bars plotted correctly 2- All 5 bars plotted correctly

(6)
(15)

[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

Structure (S)

- RNA is single stranded✓
- and is made up of nucleotides✓which comprise:
- ribose✓ sugar
- phosphate✓group
- nitrogenous bases✓ which are
- adenine, uracil, guanine and cytosine✓/ (A, U, G and C)
- The phosphate group is attached to the ribose sugar✓
- and the nitrogenous base is attached to the ribose sugar✓
- Bases on RNA are arranged in triplets✓
- as codons on mRNA✓
- and anticodons on tRNA✓
- tRNA has a clover-leaf✓/hairpin structure
- tRNA has a place of attachment for an amino acid✓ Any (9)

Involvement in protein synthesis (P)

- mRNA✓ forms
- during transcription✓/by copying the coded message from DNA
- and moves out of the nucleus✓
- and attaches to the ribosome✓
- During translation✓
- the anticodon matches the codon✓
- tRNA✓
- brings the required amino acid✓ to the ribosome
- Amino acids become attached by peptide bonds✓
- to form the required protein✓ Any (8)

Content: (17)
Synthesis: (3)
(20)

ASSESSING THE PRESENTATION OF THE ESSAY

Criterion	Relevance (R)	Logical sequence (L)	Comprehensive (C)
Generally	All information provided is relevant to the question	Ideas are arranged in a logical/cause-effect sequence	All aspects required by the essay have been sufficiently addressed
In this essay in Q4	Only information relevant to the: - structure of RNA and - involvement of the different types of RNA in protein synthesis is given There is no irrelevant information	All the information regarding the - structure of RNA and - the involvement of the different types of RNA in protein synthesis is given in a logical manner	At least: – **6/9** correct points for the structure of RNA **(S)** – **5/8** for the involvement in protein synthesis **(P)**
Mark	1	1	1

TOTAL SECTION C: 20
GRAND TOTAL: 150