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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 ✓ (b) C ✓/B		(1) (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 ✓ (b) T ✓		(1) (1)
	1.5.4	(a) Trilobites ✓ (b) Helmetids ✓ (c) Tegopeltids ✓ (d) Naraooids ✓	} OR	(1) (1) (1) (1)
		(b) Tegopeltids ✓ (c) Helmetids ✓		(1) (1)
				(8)

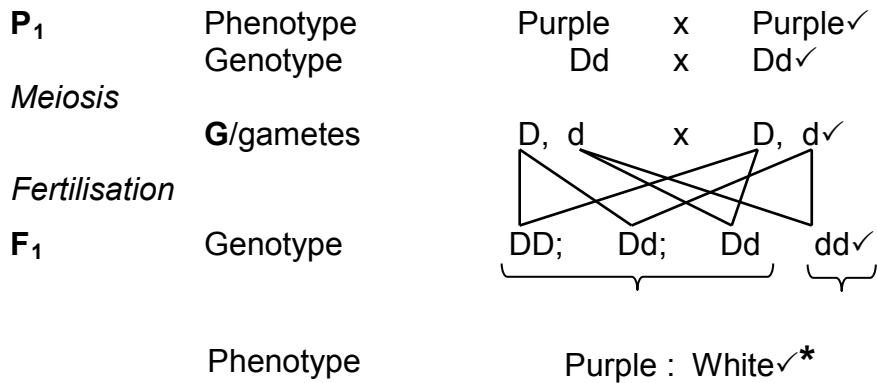
TOTAL SECTION A: 50

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) $X^D X^d$ ✓✓ (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)

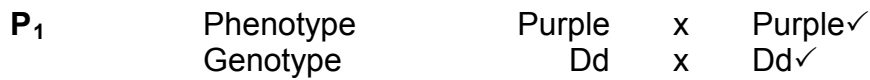
2.4.4



P₁ and
F₁✓
Meiosis and fertilisation✓

*Compulsory 1 + Any 5

OR



Meiosis

Fertilisation

Gametes	D	d
D	DD	Dd
d	Dd	dd

1 mark for correct gametes
1 mark for correct genotypes

F₁	Phenotype	Purple: White✓*
P ₁ and F ₁ ✓ Meiosis and fertilisation✓		

*Compulsory 1 + Any 5

(6)
(12)
[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)**

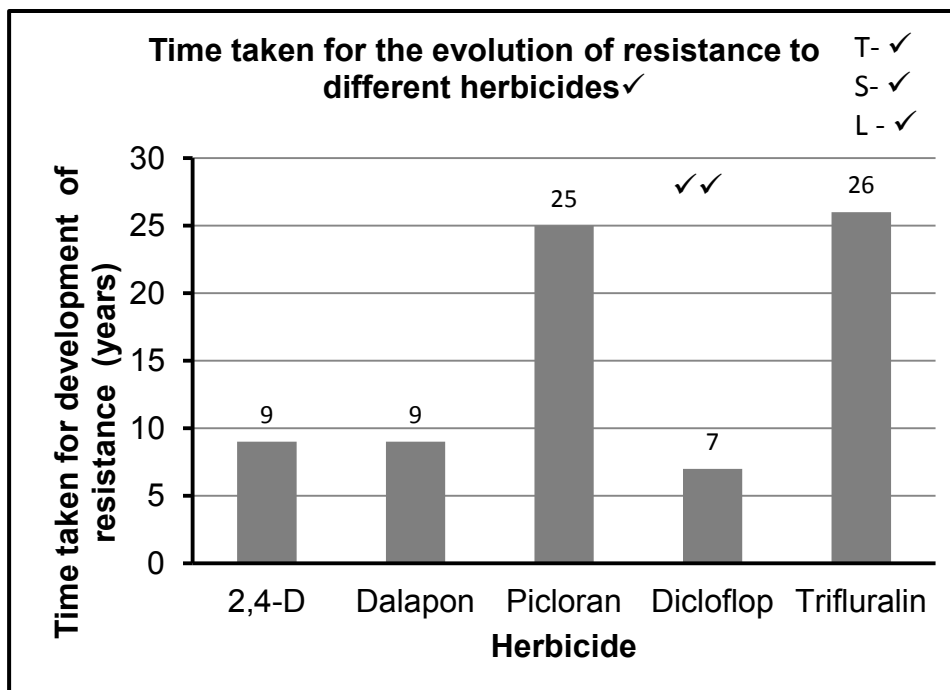
- 3.2 3.2.1 – The bright colour pattern is associated with being poisonous✓
– thus reducing predation✓ and
– improving the chances of survival✓ (3)
- 3.2.2 – There is variation in the colour of kingsnakes✓
– Some are bright in colour✓/resemble the coral snakes and
– the others are dull in colour✓
– Those 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 $\left\{\frac{80}{20}\right\} \times 100 = 400\%$
OR
 $\left\{\frac{(100-20)}{20}\right\} \times 100 = 400\%$ (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)
(9)
- (Mark first TWO only)**
- 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