



# 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)	<b>(18)</b>
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)	<b>(9)</b>
1.3	1.3.1	A only ✓✓		
	1.3.2	Both A and B ✓✓		
	1.3.3	A only ✓✓	(3 x 2)	<b>(6)</b>
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 ✓ <b>(Mark first TWO only)</b>		(2)
		(b) Double helix ✓		(1)
		(c) (DNA) Replication ✓		(1)
				<b>(9)</b>
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)
				<b>(8)</b>

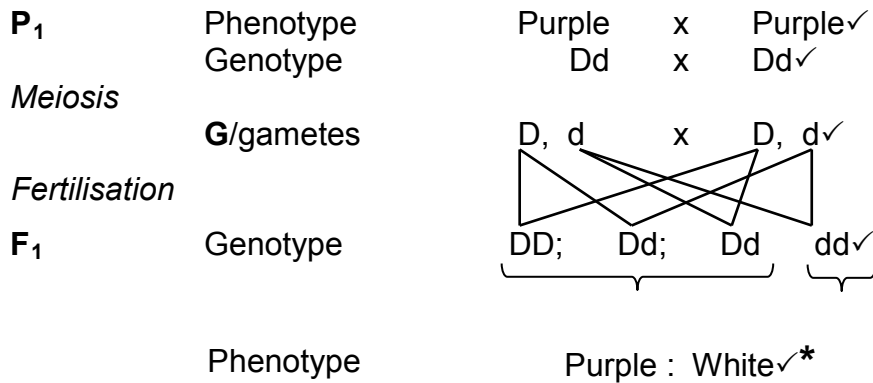
**TOTAL SECTION A: 50**

**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



P<sub>1</sub> and  
F<sub>1</sub>✓  
Meiosis and fertilisation✓

\*Compulsory 1 + Any 5

**OR**



*Meiosis*

*Fertilisation*

<b>Gametes</b>	D	d
D	DD	Dd
d	Dd	dd

1 mark for correct gametes  
1 mark for correct genotypes

**F<sub>1</sub>** Phenotype Purple: White✓\*  
P<sub>1</sub> and  
F<sub>1</sub>✓  
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

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)

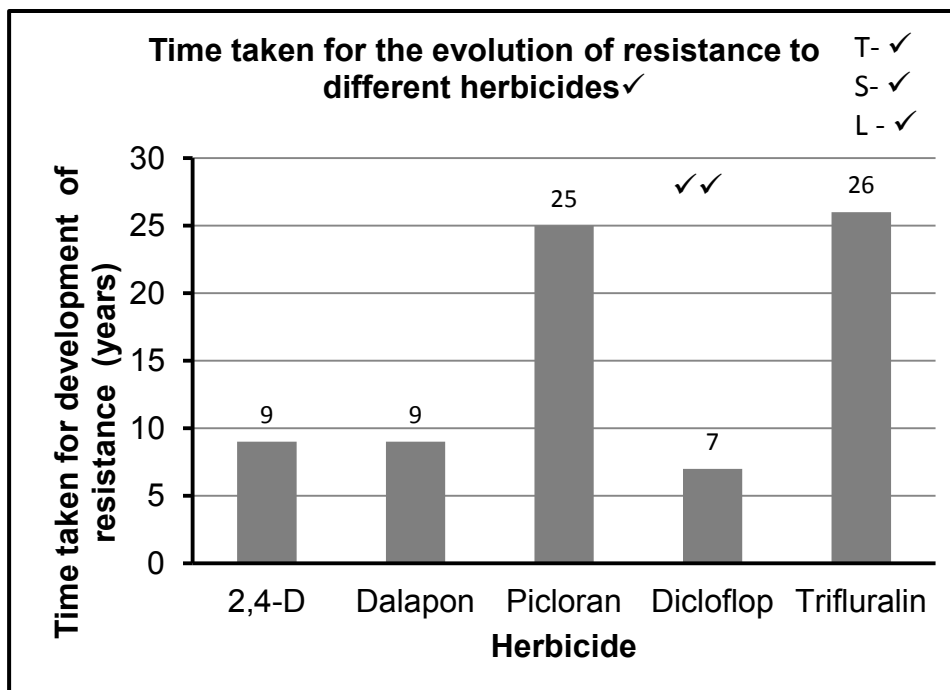
3.4.3 (a) Dicloflop✓ (1)  
 (b) Trifluralin✓ (1)

- 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)
<b>Generally</b>	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
<b>In this essay in Q4</b>	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: - <b>6/9</b> correct points for the structure of RNA <b>(S)</b> - <b>5/8</b> for the involvement in protein synthesis <b>(P)</b>
<b>Mark</b>	1	1	1

**TOTAL SECTION C: 20**  
**GRAND TOTAL: 150**