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# **NATIONAL**

# **SENIOR CERTIFICATE**

# **GRADE 12**

# **LIFE SCIENCES P2**

**NOVEMBER 2018**

# **MARKING GUIDELINES**

# **MARKS: 150**

**These marking guidelines consist of 11 pages.**

# **PRINCIPLES RELATED TO MARKING LIFE SCIENCES**

1. **If more information than marks allocated is given**

Stop marking when maximum marks is reached and put a wavy line and 'max' in the right-hand margin.

1. **If, for example, three reasons are required and five are given**

 Mark the first three irrespective of whether all or some are correct/incorrect.

1. **If whole process is given when only a part of it is required**

 Read all and credit the relevant part.

1. **If comparisons are asked for, but descriptions are given**

 Accept if the differences/similarities are clear.

1. **If tabulation is required, but paragraphs are given**

 Candidates will lose marks for not tabulating.

1. **If diagrams are given with annotations when descriptions are required**

 Candidates will lose marks.

1. **If flow charts are given instead of descriptions**

 Candidates will lose marks.

1. **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.

1. **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.

1. **Wrong numbering**

If answer fits into the correct sequence of questions, but the wrong number is given, it is acceptable.

1. **If language used changes the intended meaning**

 Do not accept.

1. **Spelling errors**

If recognisable, accept the answer, provided it does not mean something else in Life Sciences or if it is out of context.

1. **If common names are given in terminology**

Accept, provided it was accepted at the national memo discussion meeting.

1. **If only the letter is asked for, but only the name is given (and vice versa)**

Do not credit.

1. **If units are not given in measurements**

 Candidates will lose marks. Memorandum will allocate marks for units separately.

1. **Be sensitive to the sense of an answer, which may be stated in a different way.**
2. **Caption**

All illustrations (diagrams, graphs, tables, etc.) must have a caption.

1. **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.

1. **Changes to the memorandum**

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

1. **Official memoranda**

Only memoranda 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.

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| **SECTION A** |  |  |

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| --- | --- | --- |
| **QUESTION 1** |  |  |

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| --- | --- | --- | --- | --- |
| 1.1 | 1.1.11.1.21.1.31.1.41.1.51.1.61.1.71.1.81.1.9 | C 🗸🗸B🗸🗸C🗸🗸B🗸🗸A🗸🗸C🗸🗸C🗸🗸D🗸🗸 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 | 1.3.11.3.21.3.3 | A only🗸🗸Both A and B🗸🗸A only🗸🗸 (3 x 2) |  | **(6)** |
| 1.4 | 1.4.1 1.4.2 | D- Chromatid🗸 E- Centromere🗸23🗸 |  | (2)(1) |

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|  | 1.4.3 | (a)(b) | E🗸C🗸/B  |  | (1)(1) |
|  | 1.4.4 | (a)(b)(c) | Nucleus🗸 Mitochondrion🗸**(Mark first TWO only)**Double helix🗸(DNA) replication🗸 |  |  (2)(1)(1)**(9)** |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1.5 | 1.5.11.5.21.5.31.5.4 | Phylogenetic tree🗸 (A tough) exoskeleton🗸 1. S🗸
2. T🗸

|  |  |  |
| --- | --- | --- |
| 1. Trilobites🗸
 |  |  |
| 1. Helmetids🗸
 | **OR** | (b)Tegopeltids🗸  |
| 1. Tegopeltids🗸
 | (c) Helmetids🗸  |
| 1. Naraoids🗸
 |  |  |

  |  | (1)(1)(1)(1)(1)(1)(1)(1)**(8)** |

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| **QUESTION 2** |  |  |

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| 2.1 | 2.1.1 | * Non-disjunction🗸 occurred during Anaphase **I** 🗸
* Two chromosomes moved to the one pole🗸 and
* none moved to the other pole🗸 (Isn’t this obvious? To me it is more important that the learner identify Anaphase I, because if it had happened in Anaphase II the resulting diagrams would look different)
 |  | (3) |

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| --- | --- | --- | --- | --- |
|  | 2.1.2 | * Gamete **A** has 2 chromosomes🗸/an extra chromosome
* When it fertilises a normal ovum🗸
* the zygote will have 3 chromosomes🗸
* at position 21🗸 Any 3
 |  | (3) |

|  |  |  |  |  |  |
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|  | 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🗸

**OR*** Crossing over introduces genetic variation🗸 in gametes
* Genetic variation may result in unfavourable characteristics🗸
* that reduce the chance of survival🗸
 |  | (3)**(13)** |

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| 2.2 | 2.2.1 | (a)(b)(c) | Female without SCID🗸 Male with SCID🗸XDXd🗸🗸 |  | (1)(1)(2) |

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| --- | --- | --- | --- | --- |
|  | 2.2.2 | * He inherited the recessive allele (Xd) 🗸
* from the mother🗸
 |  | (2)**(6)**  |

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| 2.3 | 2.3.1 | (a)(b) | It allows for the production of organisms with desired characteristics🗸**(Mark first ONE only)*** It reduces genetic variation🗸 in offspring
* It is expensive🗸 Any 1

**(Mark first ONE only)** |  | (1)(1) |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 2.3.22.3.32.3.4 | LMJC 865 had a high average milk-production yield🗸/78 litres per day* 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🗸
* The nucleus of the donor cell was removed🗸
* and implanted into an empty ovum🗸
* The resulting zygote was stimulated to divide🗸
* The embryo was then placed into the uterus of an adult female🗸
 |  | (1)(2)(4)**(9)** |

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| 2.4 | 2.4.1 | Purple🗸 |  | (1) |

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|  | 2.4.22.4.3 | * When purple and white flowering plants are crossed 🗸
* all offspring have purple flowers🗸 /no white flowers

 * Since alleles for a characteristic are on homologous chromosomes 🗸/homologous dominant is crossed with homologous recessive
* and homologous chromosomes separate during meiosis 🗸
* each gamete will contain only one allele for each characteristic🗸
 |   | (2)(3) |

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|  | 2.4.4 |  |  |  |
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| P1 | Phenotype | Purple | x | Purple🗸 |
|  | Genotype | Dd | x | Dd🗸 |
| *Meiosis* |  |  |  |  |
|  | G/gametes |  D, d | x | D, d🗸 |
| *Fertilisation* |  |  |  |  |
| F1 | Genotype |  DD; Dd; Dd dd🗸 |
|  |  |  |
|  | Phenotype |  3 Purple : 1 White🗸\* |
| P1 and F1🗸 |   |  |  |  |
| Meiosis and fertilisation🗸 |  |  |
|  \*Compulsory 1 + Any 5 |

OR

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P1 | Phenotype | Purple | x | Purple🗸 |
|  | Genotype | Dd | x | Dd🗸 |
|  |  |  |
| *Meiosis* |  |

|  |  |  |
| --- | --- | --- |
| Gametes | D  | d |
| D | DD | Dd |
| d | Dd | dd |

1 mark for correct gametes1 mark for correct genotypes |
|  |  |
| *Fertilisation* |  |
|  |  |
|  |  |  |
| F1 | Phenotype |  3 Purple : 1 White🗸\* |
| P1 and F1🗸 |  |  |  |  |
| Meiosis and fertilisation🗸 |  |  |
|  \*Compulsory 1 + Any 5 |

 | (6)(12)[40] |

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| QUESTION 3 |  |  |

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| 3.1 | 3.1.13.1.2 | * The jaw is large in the chimpanzee🗸/smaller in *Homo sapiens*🗸
* The jaw is long and rectangular in the chimpanzee🗸/small and rounded in *Homo sapiens* 🗸
* Large spaces between the teeth in the chimpanzee🗸/small spaces in *Homo sapiens*🗸
* Large canines/teeth in the chimpanzee🗸/small canines/teeth in *Homo sapiens*🗸Any 1 x 2

**(Mark first ONE only)** * The diet changed from eating raw food🗸 in *Australopithecus*
* to a diet of cooked food🗸 in *Homo sapiens*
 |   | (2)(2) |

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|  | 3.1.3 | (a)(b) | 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✓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**(Mark first ONE only)** |  | (1)(2)**(7)** |

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| --- | --- | --- | --- | --- |
| 3.2 | 3.2.13.2.2 | * The bright colour pattern is associated with being poisonous🗸
* thus reducing predation🗸 and
* improving🗸 the chances of survival Any 3
* 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 mistaken to be poisonous and are not eaten✓
* so they survive🗸and reproduce,
* passing on the allele for bright colour to the next generation✓ over many generations the proportion of kingsnakes that are brightly coloured increases Any 6
 |   | (3)(6)**(9)** |

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| 3.3 | 3.3.13.3.23.3.3 | 1900🗸 $\left\{\frac{80}{20}\right\}$🗸 x 100🗸 = 400🗸% **OR**$\left\{\frac{\left(100-20\right)}{20}\right\}$🗸 x 100🗸 = 400🗸%

|  |  |
| --- | --- |
| **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)  |

Table🗸 + Any 2 x 2**(Mark first TWO** **only)** |  | (1)(3)(5)**(9)** |

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| --- | --- | --- | --- | --- |
| 3.4 | 3.4.1 | They outcompete the crop plants for space✓ |  | (1) |
|  | 3.4.2 | (a)(b) | Type of herbicide ✓ Time taken for development of resistance✓ |  | (1)(1) |
|  | 3.4.3 | (a)(b) | Dicloflop✓Trifluralin✓  |  | (1)(1) |

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

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|  | 3.4.5 | **Guideline for assessing the graph**

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| --- | --- |
| Bar graph drawn | 1 |
| Title of graph | 1 |
| Correct:* scale for Y-axis and
* width and interval of bars on X-axis
 | 1 |
| Correct:* label for X-axis and
* label and unit for Y-axis
 | 1 |
| Plotting of bars | 1- 1 to 4 bars plotted correctly2- All 5 bars plotted correctly |

 |  | (6)**(15)** |
|  |  |  |  | **[40]** |
|  |  |  |  |  |
|  | **Total Section b:**  |  | **80** |

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| **SECTION C** QUESTION 4 |   |  |

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| **Structure** * RNA is a single stranded✓ molecule

The Question asks for the structure of RNA and not for the structure of the different types of RNA – could be misleading of learners* made up of nucleotides✓
* Each nucleotide is made up of a ribose sugar✓
* a phosphate✓ group and
* four different nitrogenous bases✓
* adenine, uracil, guanine and cytosine✓/ (A, U, G and C)
* The phosphate group alternates with the ribose sugar✓
* and the nitrogenous base is attached to the ribose sugar✓
* mRNA is made up of many bases✓
* arranged in triplets called codons✓
* Bases in tRNA are arranged in triplets called anticodons✓
* tRNA has a place of attachment for an amino acid✓ Any 10

**Involvement in protein synthesis*** Free nucleotides arrange to form mRNA according to the DNA

template. ✓* This process is called transcription. ✓
* mRNA carries the coded message ✓ from DNA
* and moves out of the nucleus✓
* through the nuclear pores ✓
* to the cytoplasm ✓
* and attaches to the ribosome✓
* During translation✓
* the anticodon on the tRNA✓
* matches the codon on the mRNA✓
* bringing the required amino acid to the ribosome✓
* Amino acids become attached by peptide bonds✓ Any 7

Content: Synthesis: |  | (10)(7)(17) (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:* **7/10** correct points for the

 structure of RNA * **4/7** for the involvement in protein synthesis
 |
| **Mark** | 1 | 1 | 1 |

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|  | **Total Section C:**  | **20** |
|  |  **GRAND TOTAL:** | **150** |