

**PREPARATORY EXAMINATION**

**2019**

**MARKING GUIDELINES**

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| **LIFE SCIENCES (PAPER 2) (10832)** |

**11 pages**

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| **GAUTENG DEPARTMENT OF EDUCATION**  **PREPARATORY EXAMINATION**  **LIFE SCIENCES**  **(Paper 2)**  **MARKING GUIDELINES** |

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| PRINCIPLES RELATING TO THE MARKING OF LIFE SCIENCES 1. **If more information than marks allocated is given** Stop marking when maximum mark is reached and put a wavy line and 'max' in the right hand margin. |
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| 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 the whole process is given when only part of it is required**  Read all and credit relevant parts. |
|  |
| 4. **If comparisons are asked for and 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-recognized 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. |
|  |
| 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 recognizable accept, provided it does not mean something else in Life Sciences or if it is out of context. |
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| 13. **If common names are given in terminology**  Accept, provided it was accepted at the memo discussion meeting. |
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| 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 captions. |
| 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. **Changes to the memorandum**  No changes may be made to the ratified memorandum without consultation with the Provincial Internal Moderator. |

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| --- | --- | --- | --- |
| **SECTION A** | | |  |
|  | | |  |
| **QUESTION 1** | | |  |
| 1.1 | 1.1.1  1.1.2  1.1.3  1.1.4  1.1.5  1.1.6  1.1.7  1.1.8  1.1.9 | B🗸🗸  B🗸🗸  C🗸🗸  C🗸🗸  A🗸🗸  B🗸🗸  D🗸🗸  D🗸🗸  C🗸🗸 |  |
|  |  | (9 x 2) | **(18)** |
| 1.2 | 1.2.1 | Multiple allelic🗸 / multiple alleles |  |
|  | 1.2.2 | Gene🗸 |  |
|  | 1.2.3 | Co-dominance🗸 |  |
|  | 1.2.4 | Stem cells🗸 |  |
|  | 1.2.5 | Cloning🗸 |  |
|  | 1.2.6 | Mitochondrion🗸 |  |
|  | 1.2.7 | Heterozygous🗸 |  |
|  | 1.2.8 | Genome🗸 |  |
|  |  | (8 x 1) | **(8)** |
| 1.3 | 1.3.1 | B only🗸🗸 |  |
|  |  |  |  |
|  | 1.3.2 | None🗸🗸 |  |
|  |  |  |  |
|  | 1.3.3 | Both A and B🗸🗸 |  |
|  |  | (3 x 2) | **(6)** |
|  |  |  |  |
| 1.4 | 1.4.1 | DNA replication  | (1) |
|  |  |  |  |
|  | 1.4.2 | Nucleotide | (1) |
|  |  |  |  |
|  | 1.4.3 | 1 – guanine |  |
|  |  | 2 – cytosine | (2) |
|  |  |  |  |
|  | 1.4.4 | Double helix | (1) |
|  |  |  |  |
|  | 1.4.5 | Hydrogen bond | (1) |
|  |  |  | **(6)** |

|  |  |  |  |
| --- | --- | --- | --- |
| 1.5 | 1.5.1 | **A** cell membrane / plasmalemma  **B** homologous chromosomes / bivalent  **D** spindle fibres | (3) |
|  |  |  |  |
|  | 1.5.2 | The chromosomes are of the:   * Same size🗸 * Same shape🗸 * Same length🗸 Any   **(Mark first TWO only)** | (2) |
|  |  |  |  |
|  | 1.5.3 | **I** metaphase 1🗸  **II**  prophase 1🗸  **III** metaphase 2🗸 | (3) |
|  |  |  |  |
|  | 1.5.4 | * Single row of chromosomes🗸 * at the equator🗸 | (2) |
|  |  |  |  |
|  | 1.5.5 | * Crossing over🗸 * Random arrangement of chromosomes🗸 | (2) |
|  |  |  | **(12)** |
|  |  | **TOTAL SECTION A:** | **50** |

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| **SECTION B** |
| **QUESTION 2** |

|  |  |  |  |
| --- | --- | --- | --- |
| 2.1 | 2.1.1 | CCT✓ | (1) |
|  |  |  |  |
|  | 2.1.2 | * Amino acid isoleucine will be coded for✓ * instead of phenylalanine✓ * A different protein may form✓ / nonsense protein formed / protein’s function may be affected | (3) |
|  |  |  |  |
|  | 2.1.3 | * In replication DNA is formed✓   and in transcription mRNA is formed✓   * In replication 2 strands of DNA act as a template✓   and in transcription 1 strand of DNA is used as a template✓   * In replication thymine is complementary to adenine✓   and in transcription uracil is complementary to adenine✓  **(Mark first TWO only)** Any 2 x 2 | (4) |
|  |  |  | **(8)** |
|  |  |  |  |
| 2.2 | 2.2.1 | Peptide ✓bond | (1) |
|  | 2.2.2 | tRNA ✓ | (1) |
|  | 2.2.3 | GCA✓ | (1) |
|  | 2.2.4 | Ribosome✓ | (1)  **(4)** |
| 2.3 | 2.3.1 | Tom and Harry✓ | (1) |
|  | 2.3.2 | They both have blood type O ✓ | (1) |
|  | 2.3.3 | Type A ✓ and Type B✓ | (2) |
|  |  |  | **(4)** |
|  |  |  |  |
| 2.4 | 2.4.1 | Incomplete dominance✓ | (1) |
|  | 2.4.2 | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | P2 | Phenotype | Grey coat rat | | x | Grey coat rat🗸 | |  | Genotype | WB | | x | WB 🗸 | | *Meiosis* |  |  | |  |  | |  | G/gametes | W , B | x | | W , B 🗸 | | *Fertilisation* |  |  | |  |  | | F2 | Genotype | WW : WB : WB : BB🗸\* | | | | |  |  |  | | | | |  | Phenotype | 1 White coat : 2 Grey coats: 1 Black coat🗸\* | | | | | P2 and F2🗸 |  |  | |  |  | | Meiosis and fertilisation 🗸 | | | | | | | 2 compulsory + Any 4 | | | | | |   **OR**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | P2 | Phenotype | Grey coat rat | x | | Grey coat rat✓ | |  | Genotype | WB | x | | WB🗸 | |  | |  |  |  | | --- | --- | --- | | Gametes | W | B | | W | WW | WB | | B | WB | BB |   1 mark for correct gametes🗸  *1 mark for correct genotypes🗸\** | | | | | | *Meiosis* | |  | | *Fertilisation* | |  | |  | | F2 | Phenotype | 1 White coat: 2 Grey coats: 1 Black coat🗸\* | | | | | |  |  |  | |  |  | | P2 and F2🗸 |  |  | |  |  | | Meiosis and fertilisation🗸 | | | |  |  | | 2 compulsory + Any 4 | | | | | | | (6) |
|  |  |  | **(7)** |
|  |  |  |  |
| 2.5 | 2.5.1 | Purple flowers, long pollen grains ✓ | (1) |
|  |  |  |  |
|  | 2.5.2 | ab ✓✓ | (2) |
|  |  |  |  |
|  | 2.5.3 | Purple flowers, long pollen grains 🗸: purple flowers, round pollen grains 🗸 | (2) |
|  |  |  | **(5)** |
|  |  |  |  |
| 2.6 | 2.6.1 | (a) Time✓ / Source of milk  (b) Mass✓/ Weight | (1)  (1) |
|  |  |  |  |
|  | 2.6.2 | * Same age ✓ * Same mass to start off with ✓ * Same time intervals of measurement ✓ * Same unit of measurement of mass✓   **(Mark first ONE only)** Any | (1) |
|  |  |  |  |
|  | 2.6.3 | 15,8 – 4  x 100 = 295%  4 | (3) |
|  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 2.6.4 | | Mass gain of two babies from ages 2-8 months fed on two sources of milk  Rubric for assessment of the graph   |  |  | | --- | --- | | **Criterion** | **Mark Allocation** | | Correct type of graph (**T**) | 1 | | Caption for graph (**C**) | 1 | | Correct labels including units for X-axis and Y-axis (**L**) | 1 | | Correct scales for y-axis and size of bars and spaces between bars (**S**) | 1 | | **Plotting of points:** |  | | 1 to 7 bars correct (**P**) | 1 **OR** | | Graph drawn for **required months** only, with all 8 bars correct | 2 | | | | (6)  **(12)** |
|  | |  | |  | **[40]** | |

**QUESTION 3**

|  |  |  |  |
| --- | --- | --- | --- |
| 3.1 | 3.1.1 | * Due to use or disuse✓ /more or less use of an organ * it becomes more or less developed✓ * and this acquired characteristic✓ * is passed on to the offspring✓ | (4) |
|  | 3.1.2 | * Punctuated equilibrium explains the speed at which evolution * occurs✓ * it involves long periods of time✓ * where species do not change ✓/change gradually through natural   selection   * known as equilibrium✓   alternating with short periods of time✓  where rapid changes✓ occur through natural selection  Any | (4) |
|  | 3.1.3 | |  |  | | --- | --- | | **Natural selection** | **Artificial selection** | | The environment or nature is the selective force✓ | Humans represent a selective force✓ | | Selection is in response to suitability to the environment✓ | Selection is in response to satisfying human needs✓ | | Occurs within species✓ | May involve one or more species✓ | |  |
|  |  | **(Mark first TWO only)** ✓table | (5) |
|  |  |  | **(13)** |
|  |  |  |  |
| 3.2 | 3.2.1 | *Anolis scriptus*🗸 | (1) |
|  |  |  |  |
|  | 3.2.2 | * Short hind limbs✓ * Bigger toepads✓ * Longer arms✓   **(Mark first TWO only)** Any | (2) |
|  |  |  |  |
|  | 3.2.3 | * Longer hind legs acted as sails✓catching the wind✓ / carrying the lizard away into the sea | (2) |
|  |  |  | **(5)** |
| 3.3 |  | * There was variation in the spike shape of the cell wall🗸 of the  bacteria population. * Bacteria with triangle spikes and square spikes🗸 * were not antibiotic resistant🗸/ antibiotics were able to bind to the surface * and were killed by the antibiotics 🗸/ did not survive * The bacteria with the round spikes🗸 * were resistant to the antibiotics🗸/ antibiotics were unable to bind to the surface * and they survived🗸 * and reproduced, passing the characteristic of round spikes to the next generation✓ increasing the proportion of these bacteria   Any | **(6)** |
|  |  |  |  |
| 3.4 | 3.4.1 | **X** – foramen magnum✓  **Y** – canines✓ | (1)  (1) |
|  |  |  |  |
|  | 3.4.2 | * The more forward position of the foramen magnum✓/ X * allows the spinal cord to exit the skull directly downwards✓ * This acts as an axis for the skull✓ * making it favourable for bipedalism✓/ an upright position   Any | (3) |
|  |  |  |  |
|  | 3.4.3 | (a) **B**✓ | (1) |
|  |  |  |  |
|  |  | (b) **A**✓ | (1) |
|  |  |  |  |
|  | 3.4.4 | * There is an increase🗸 * in the cranium size🗸from organism **B** to organism **C** * This will allow it to house a larger brain🗸/ cerebrum which   suggests greater intelligence | (3) |
|  |  |  |  |
|  | 3.4.5 | (a)   * The spine changed from C-shaped to more curved ✓/ s-shape, * which provides better support for bipedalism✓   (b)   * The pelvis changed from being long and narrow to shorter and wider✓, * to support the body weight in an upright position✓ | (2)  (2) |
|  |  |  |  |
|  | 3.4.6 | * The oldest fossils of *Homo erectus* were found in Africa✓, * while the younger fossils were found in other parts of the world✓ * suggesting that *Homo erectus* originated in Africa✓ Any | (2) |
|  |  |  | **(16)** |
|  |  |  | **[40]** |
|  |  | **TOTAL SECTION B:** | **80** |

**SECTION C**

**QUESTION 4**

**Speciation**

* If a population of a single species becomes separated
* by a geographical barrier (sea, river, mountain, lake)
* There is now no gene flow between the populations / the populations can no longer interbreed.
* Since each population may be exposed to different environmental conditions,
* natural selection occurs independently in each of the two populations
* such that the individuals of the two populations become very different
* genotypically and phenotypically.
* Even if the populations were to mix again,
* they will not be able to reproduce with each other.
* They have thus become different species.

 Any (9)

**Reproductive isolating mechanisms**

* **Breeding at different times of the year**
* One species is fertile when the other is not
* **Species-specific courtship behaviour**
* Courtship behaviour of one species will not attract other species
* **Adaptation to different pollinators**
* Pollinator of one species is not adapted to pollinate another species
* **Infertile offspring**
* A new species cannot form because they cannot produce fertile offspring
* **Pheromonesare used to attract mates**
* If the pheromones are not correct, they will not mate
* **Different genitalia**
* Unsuited / incompatible reproductive organs prevent mating Any 4 x 2 (8)

**NOTE:** NO marks will be awarded for answers in the form of flow charts, tables or diagrams.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ASSESSING THE PRESENTATION OF THE ESSAY**   |  |  |  |  | | --- | --- | --- | --- | | **Criterion** | **Relevance (R)** | **Logical sequence (L)** | **Comprehensive (C)** | | **Generally** | All information provided is relevant to the topic. | 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:   * Geographic speciation * Reproductive isolation   mechanisms was included.  There is no irrelevant information | The description of:   * Geographic speciation is logical and sequential * Reproductive isolation mechanisms are in a logical sequence | Minimum correct points include:   * **6/9** for Geographic speciation * **5/8** for Reproductive isolating mechanisms | | **Mark** | 1 | 1 | 1 | |

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