

**SENIOR CERTIFICATE EXAMINATIONS**

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| **LIFE SCIENCES P1**  **2016  MEMORANDUM** |

**MARKS: 150**

**This memorandum consists 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 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.

1. **Changes to the memorandum**

No changes must be made to the memoranda without consulting the provincial internal moderator 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 | 1.1.1  1.1.2  1.1.3  1.1.4  1.1.5  1.1.6  1.1.7  1.1.8  1.1.9  1.1.10 | C🗸🗸  B🗸🗸  B🗸🗸  D🗸🗸  D🗸🗸  C🗸🗸  A🗸🗸  B🗸🗸  C🗸🗸  D🗸🗸 (10 x 2) |  | **(20)** |

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| 1.2 | 1.2.1 | External🗸 fertilisation |  |  |
|  | 1.2.2 | Geotropism🗸/gravitropism |  |  |
|  | 1.2.3 | Vasoconstriction🗸 |  |  |
|  | 1.2.4 | Precocial🗸 |  |  |
|  | 1.2.5 | Cristae🗸 |  |  |
|  | 1.2.6 | Thermal🗸 pollution |  |  |
|  | 1.2.7 | Choroid🗸 (7 x 1) |  | **(7)** |

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| 1.3 | 1.3.1 | (a) Tympanic🗸 membrane/tympanum/(eardrum)  (b) Incus🗸/Anvil  (c) Oval window🗸 |  | (1)  (1)  (1) |
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|  | 1.3.2 | D🗸 |  | (1) |

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|  | 1.3.3 | E🗸 – Eustachian tube🗸 |  | (2)  **(6)** |

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| 1.4 | 1.4.1 | (a) Hypophysis🗸/ Pituitary gland  (b) Adrenal🗸 gland |  | (1)  (1) |
|  | 1.4.2 | (a) D🗸 – Testis🗸   1. C🗸 – Pancreas🗸/Islets of Langerhans 2. A🗸 – Hypophysis🗸/Pituitary gland |  | (2)  (2)  (2)  **(8)** |

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| 1.5 | 1.5.1 | (a) Grey matter🗸/Spinal cord  (b) Cerebrum🗸 |  | (1)  (1) |

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|  | 1.5.2 | 1. D🗸 - Cerebrum🗸 2. F🗸 - Medulla oblongata🗸 |  | (2)  (2) |

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|  | 1.5.3 | Reflex action🗸 |  | (1) |

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|  | 1.5.4 | A🗸 – Motor🗸neuron /(efferent neuron) |  | (2)  **(9)** |

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| **Total Section A:** |  | **50** |

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

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| 2.1 | 2.1.1 | (a) Nucleus🗸  (b) Tail🗸 |  | (1)  (1) |

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|  | 2.1.2  2.1.3 | * C/ middle piece contains mitochondria🗸   that provides energy for movement🗸   * Has a tail🗸   for swimming🗸  - Torpedo shape🗸  reducing friction🗸 Any (1 x 2)  **(Mark first ONE only)**   * No acrosome🗸 will be present in the sperm cell * therefore no enzymes present🗸 * Sperm cell will be unable to penetrate the ovum🗸 * \*therefore no fertilisation will occur🗸   \***compulsory mark** + any other 2 |  | (2)  (3)  **(7)** |

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| 2.2 | * Pinna traps the sound waves🗸 * and directs it into the ear canal🗸/meatus * This causes the tympanic membrane to vibrate🗸 * The vibration is transmitted to the ossicles🗸/names of all 3 ossicles * The ossicles amplify the vibration🗸 * and transmit it to the oval window🗸 * The oval window vibrates🗸 * creating pressure waves in the perilymph/endolymph🗸(fluid) * which stimulates the Organ of Corti🗸 Any |  | **(6)** |

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| 2.3 | 2.3.1  2.3.2  2.3.3  iris  pupil  sclera  2.3.4 | Iris🗸/radial and circular muscles  (20 – 30)🗸s   * Radial muscles contract🗸 * Circular muscles relax🗸 * Pupil increases in diameter🗸/dilates   Correct drawing of the front view of an eye🗸  Pupil = 6 mm🗸  Any 2 correct labels🗸🗸 |  | (1)  (1)  (3)  (4)  **(9)** |

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| 2.4 | 2.4.1  2.4.2  2.4.3 | To maintain an internal balance🗸/set point/homeostasis/regulate metabolism  TSH🗸/ thyroid-stimulating hormone  When Y/thyroxin is released at higher levels than normal:   * Metabolism will be higher than normal🗸/cellular respiration increases * Heart rate increases🗸 * thus all the energy from food eaten will be used🗸 * leaving nothing to be utilised for storage🗸/therefore could lead to a person being underweight * can also lead to anxiety🗸 (Any 3) |  | (1)  (1)  (3)  **(5)** |

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| 2.5 | 2.5.1 | (a) Time🗸  (b) Average age of first menstruation🗸 |  | (1)  (1) |

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|  | 2.5.2  2.5.3  2.5.4 | * Decide on sample size🗸 * Decide on proportion from racial groups🗸 * Decide on the age range of participants🗸 * Decide on proportions from socio-economic status of sample🗸 * Decide on the recording tool🗸/ instrument /method * Ask permission 🗸from participants Any   **(Mark first THREE only)**   * The hypothesis will be rejected🗸/not accepted * and therefore needs to be reformulated🗸 * Breast development🗸 * Widening of hips🗸 * Development of pubic hair🗸/(body hair) Any   **(Mark first TWO only)** |  | (3)  (2)  (2)  **(9)** |

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| 2.6 | * High levels of progesterone🗸 * Inhibits secretion of FSH🗸 * There is no development of a follicle🗸 * Therefore no ovum released/ovulation🗸 * Thus there will be no fertilisation🗸 Any | |  | **(4)** |
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| QUESTION 3 |  |  |

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| 3.1 | 3.1.1  3.1.2  3.1.3  3.1.4 | 0,50 🗸mol/mℓ   * To establish a baseline🗸/minimum CO2 in the blood   To allow a comparison with results🗸  **OR**   * Acts as a control🗸   To determine if the results obtained are caused by the exercise🗸/independent variable Any (1 x 2)   * Body’s metabolic rate increases🗸 * this means that the rate of cellular respiration increases🗸 * to produce more energy🗸/ ATP   and therefore releases more CO2 Any  CO2 levels in the blood increase above normal levels:   * Receptor cells in the carotid artery in the neck are stimulated🗸 * To send impulses to the medulla oblongata🗸 in the brain * Medulla oblongata stimulates breathing muscles🗸/(intercostal muscles and diaphragm) * and heart🗸 * Breathing muscles contract more actively🗸 * increasing the rate of breathing🗸 * and depth of breathing🗸 * The heart beats faster🗸 * More CO2 is taken to and exhaled from the lungs🗸 Any |  | (1)  (2)  (2)  (6)  **(11)** |

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| 3.2 | 3.2.1  3.2.2 | Apical tips🗸/stem tips/root tips/bud  **(Mark first ONE only)**  Promotes cell elongation🗸  **(Mark first ONE only)** |  | (1)  (1) |

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|  | 3.2.3 | * Only kills part of a plant🗸/leaves and stems   leaving the chance of the roots to grow again🗸     * Poisonous🗸   can be harmful to other organisms🗸 Any (2 x 2)  **(Mark first TWO only)** |  | (4) |

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|  | 3.2.4 | * It could kill the beans as well🗸   thus reducing the yield of the crop🗸 |  | (2)  **(8)** |

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| 3.3 | 3.3.1 | 23 X 360° = 82,8°/ 83°  100  39 X 360° = 140,4° /140°  100  36 X 360° = 129,6° /130°  100  2 X 360° = 7,2°/ 7°  100 |  |  |

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|  | **Mark allocation for the graph**   |  |  | | --- | --- | | **Criteria** | **Mark allocation** | | Correct type of graph (**pie chart**) (T) | 1 | | Title of graph (including both variables) | 1 | | Calculations/working to (C)determine the correct proportions | 1: 1 to 3 calculations correct  2: All four calculations correct | | Proportions accurate for each sector/slice labelled /key (P) | 1: 1 to 3 sectors drawn correctly  2: All 4 sectors drawn correctly  (**use transparency template)** | |  |  |

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|  | **NOTE:**  If the wrong type of graph is drawn: marks will be lost for 'correct type of graph' as well as for 'drawing of sectors in correct proportion'. |  | (6) |

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| 3.3 | 3.3.2  3.3.3 | * It may outcompete indigenous vegetation🗸 * thus reducing the amount of food available for herbivores🗸 * Leading to death of organisms🗸 * This will disrupt food chains🗸/webs * and the ecosystems🗸   OR   * An excessive growth of alien water plants on the surface of the   water will block out the light🗸/deprive submerged plants of  sunlight/limits photosynthesis   * thus reducing the amount of food available for herbivores🗸 * Leading to death of organisms🗸 * disrupting food chains🗸/webs * and the ecosystems🗸 Any   Poaching🗸/Poisoning/Trading in endangered species |  | (3)  (1)  **(10)** |

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| 3.4 | 3.4.1  3.4.2  3.4.3  3.4.4 | Wheat🗸  Rice🗸  Maize🗸  Soybeans🗸 Any  **(Mark first ONE only)**   * A single crop is repeatedly planted over a large area🗸 * This provides large amounts of food🗸 for particular organisms/pests * Organisms/pests increase in number🗸 * Causing more damage to crops🗸 Any * Floods destroy present crops🗸   leading to decreased crop yields🗸   * Floods remove the upper fertile layers of soil🗸/soil erosion   leading to decreased fertility of soil causing decreased crop yield🗸   * Floods supersaturate the soil🗸   leading to rotting of crop🗸/decomposition of roots Any (1 x 2)  **(Mark first ONE only)**     * The demand🗸 for staple food is higher   than the supply🗸  - Production/operating costs higher🗸🗸 Any (1 x 2) |  | (1)  (3)  (2)  (2)  **(8)** |
| 3.5 | * Deforestation is the removal of vegetation from an area🗸 * Plants use carbon dioxide from the atmosphere for photosynthesis🗸 * Fewer trees means less photosynthesis🗸 * Therefore less CO2 removed from the atmosphere🗸/more CO2 remains in the atmosphere * leading to enhanced greenhouse effect🗸 * leading to **increased** global warming🗸 Any | |  | **(3)**  **[40]** |

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|  |  | **TOTAL SECTION B:** |  | **80** |

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| **SECTION C**    QUESTION 4  Genetic variation is brought about in gametes through meiosis✓ in two ways:  **Crossing-over** ✓   * During Prophase I✓ * Homologous chromosomes✓/bivalents pair up * Each chromosome has 2 chromatids✓ * Non-sister chromatids of the homologous pair overlap✓/cross over * Points at which crossing-over takes place are referred to as chiasmata✓ * Genetic material is exchanged✓ * between non-sister chromatids✓ * After the process of crossing-over chromosomes have genes from its   homologous partner✓   * This means that each gamete formed will have a mix of genes from maternal   and paternal parents✓ Max  **\*Random arrangement of chromosomes at the equator** ✓   * During Metaphase I✓ * Each pair of homologous chromosomes✓ * \*may line up either way✓/randomly on the equator of the spindle * \*Independently of what the other pairs are doing✓/ independent assortment * During Metaphase II✓ * Each individual chromosome✓ * \*may line up either way✓/flipped on the equator of the spindle * \*This means that gametes will have differing number/mix of maternal and   paternal chromosomes✓/chromatids Max  **(at least 1 of the \*compulsory and any 4 which could include compulsory points)**  **Formation of an ovum**   * During oogenesis✓ * diploid cells✓ * in the ovary✓ * undergo meiosis✓ * to form a primary oocyte✓ * consisting of haploid cells✓ * One cell✓ develops into an ovum   Max  Content:  Synthesis: |  | (7)  (5)  (5)  (17)  (3)  **(20)** |

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| **ASSESSING THE PRESENTATION OF THE ESSAY** |  |  |

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| **Relevance** | **Logical sequence** | **Comprehensive** |
| All information provided is relevant to the question | Ideas arranged in a logical/ cause-effect sequence | Answered all aspects required by the essay in sufficient detail |
| All the information provided is relevant to crossing over, random arrangement and development of an ovum.  There is no irrelevant information | All the information regarding crossing over, random arrangement and development of an ovum is arranged in a logical manner. | At least the following marks should be obtained:   * Crossing over (**5/7**) * Random arrangement (**3/5**) * Development of an ovum (**3/5**) |
| 1 mark | 1 mark | 1 mark |

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