

**SENIOR CERTIFICATE EXAMINATIONS**

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

**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 | 1.1.11.1.21.1.31.1.41.1.51.1.61.1.71.1.81.1.91.1.10 | 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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|  | 2.1.22.1.3 | * 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 | 2.3.12.3.22.3.3irispupilsclera2.3.4 | 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 | 2.4.12.4.22.4.3 | To maintain an internal balance🗸/set point/homeostasis/regulate metabolism TSH🗸/ thyroid-stimulating hormoneWhen 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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|  | 2.5.22.5.32.5.4 | * 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)** |
|  |  |  |  | **[40]** |

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| QUESTION 3 |  |  |

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| 3.1 | 3.1.13.1.23.1.33.1.4 | 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 AnyCO2 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 | 3.2.13.2.2 | 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**

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| **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 correctly2: 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 | 3.3.23.3.3 | * 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 | 3.4.13.4.23.4.33.4.4 | 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 4Genetic 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

 MaxContent: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** |