UNIVERSITY OF MALTA

THE MATRICULATION CERTIFICATE EXAMINATION
INTERMEDIATE LEVEL

BIOLOGY

May 2016

EXAMINERS' REPORT

MATRICULATION AND SECONDARY EDUCATION
CERTIFICATE EXAMINATIONS BOARD

Biology

Intermediate Level

May 2016

Part 1: Statistical Information

GRADE	A	B	C	D	E	F	abs	TOTAL
NUMBER	17	39	75	53	42	54	25	305
% OF TOTAL	5.6	12.8	24.6	17.4	13.8	17.7	8.2	100

Table 1: Distribution of Grades awarded in May 2016

Part 2: Comments regarding candidate's performance

Section A

General Comments

The overall performance in Section A was satisfactory. Most candidates actually gained more than 50% of the marks. The extremely low marks of certain candidates might reflect that some candidates are sitting for the exam before they cover the whole syllabus.
Candidates had difficulties in understanding particular questions and particular biological terms.
The candidate's inability to use biological terms or spelling biological terms was evident.

Question 1: Chemicals in living organisms

Q1.1 Several candidates answered this question correctly. However most candidates were unable to identify all four elements, often including compounds such as carbon dioxide or water in their answer. Few candidates listed basic biomolecules instead.

Q1.2 Generally answered correctly. Incorrect responses listed compounds or basic elements that should have been mentioned in 1.1. Several also mentioned phosphate instead of phosphorus.

Q1.3 It seems that the majority of candidates did not understand this question, possibly the term 'polarity'. In fact the majority of candidates did not attempt this question. Others labelled the molecule and the bonds or added 'extra' bonds or 'elements' to the molecule. The charges were sometimes inverted i.e. oxygen marked as having a positive charge. Out of the candidates who correctly marked the charges correctly, few included the sign showing partial charge.

Q1.4 Answers here often lacked necessary detail. Candidates need to understand the term 'explain'.
Water as a coolant: Whilst most candidates referred to production of sweat and evaporation, most did not explain how this has a cooling effect. Others incorrectly linked the cooling effect of water to its high specific heat capacity.

Water as a transport medium: Very few candidates linked this to the liquid nature of water and its solvent properties. However most did refer to the role of water in vascular tissues.
Water as a habitat: Practically none of the candidates mentioned the fact that water acts as a habitat because it is a liquid at room temperature. Yet, most correctly explained how the high specific heat capacity of water maintains a relatively constant temperature. Incorrect answers generally referred to the need of water to survive, indicating that the candidates did not understand the term 'habitat'.

Question 2: Human Impact on the Environment

Responses to questions 2.1 and 2.2 indicate that several candidates cannot distinguish between 'effects' and 'causes'.
Q2.1 Most candidates correctly described a harmful effect on the environment of agriculture, waste disposal and environmental pollution.
The following points should be addressed:
Confusing pesticides and fertilizers, and thus linking pesticides to eutrophication.
Confusing global warming and ozone depletion.

Q2.2 Answers were generally correct although not always specific. Thus specific reference to 'combustion of fossil fuels' was often lacking; candidates just mentioned 'use of fossil fuels'. Reference to global warming was frequent. The markers note that global warming is an effect of and not the cause of climate change. Confusion of global warming and ozone depletion was frequent.
Q2.3 Vast majority of candidates correctly identified two activities through which citizens can help place Malta on a more environmentally sustainable pathway. Correct reference to use of photovoltaics and the three R's was noted.

Question 3: Protein Synthesis
Vast majority of candidates scored very low marks in this question.
Q3.1 Most candidates answered this question well. Yet a significant number gave the complementary base sequence on DNA rather than the sequence on mRNA.
Q3.2 Majority of answers were incorrect. Majority of candidates did not answer this question or parts of it. Very few candidates identified Structure C as the tRNA molecule, often mistaking it for a ribosome. Transcription and translation were often inverted. Some candidates confused protein synthesis and DNA replication.
Q3.3 Most answers were correct.
Q3.4 Majority of answers were irrelevant, with candidates often referring to 'proof reading' to avoid mutations. The correct answers often lacked necessary detail, and thus very few candidates gained the 3 marks allotted to this question. The term 'degenerate' was rarely used, although often explained. Reference to information in the table was often omitted.

Question 4: Diversity of Life
Vast majority of candidates answered this question well. Incorrect responses included reference to kingdom Prokaryota instead of Protoctista. The markers note that proper names of kingdom Animalia and Plantae were often replaced with Animal and Plant respectively. This is not supported in the syllabus. Furthermore the term Protoctista should not be replaced with Protista.

Question 5: Cell Cycle
Q5.1 Most candidates referred to the replication of DNA during interphase but did not refer to replication of organelles and / or replication of centrioles. Several answers were unspecific, typically suggesting that 'interphase is the step before cell division'.
Q5.2 Generally candidates were unable to describe processes occurring during nuclear division. Sometimes candidates confused nuclear and cell division.
Q5.3 Generally candidates correctly referred to cytokinesis and formation of 2 cells.
Markers noted candidates' awareness of both mitosis and meiosis.

Question 6: Gaseous Exchange
Q6.1 Vast majority of candidates answered this question well.
Q6.2 Vast majority of candidates were incorrect. These included a description of the pathway that air follows during inhalation, reference to gaseous exchange in the alveoli and a description of adverse effects of inhaling smoke.
Q6.3 Majority of answers were correct. Incorrect responses included reference to effects of smoking rather than effects of nicotine.
Q6.4 Majority of candidates answered this question well. Markers noted the correct reference to the 'fluid layer' on alveoli that facilitates diffusion (and not reference to a faster rate of diffusion).

Section B

Question 7: Relationships in ecosystems

Q7.1 Several candidates classified correctly the feeding relationship between the different trophic levels. Many listed and explained the terms producers and 1°, 2° and in some cases 3° consumers. They also described the respective feeding relationship such as autotrophs, herbivores and carnivores. Very few candidates discussed the importance of the different groups of saprotrophs being decomposers and detrivores at the trophic levels. Unfortunately some candidates gave answers pertaining to questions 7.2/7.3 and 7.4 in this part.

Q7.2 The majority of candidates explained that energy is lost from a previous trophic level to the next one. Several supplied the percentage of energy loss from one level to another. Unfortunately values stated ranged from 10% to 90% with many intermediate values. Several candidates did not give all the reasons as to why only a small percentage of energy moves to the next trophic level. Few candidates explained that the 5° trophic level is rarely exceeded.

Q7.3 Most candidates answered this question correctly, giving definitions of predator and prey and explaining the interlinked rise and fall of the two populations.

Q 7.4 While many candidates defined and gave examples of a parasite and a host, only few candidates described the action of parasites on dense populations.

Question 8: Nervous System

Q8.1 This question was about co-ordination and the role of the several areas of the brain working together for a particular skill or life-sustaining system. Many candidates did not understand the latter and simply listed definitions of five different parts of the brain. There was no link between a specific skill and how the brain co-ordinates that skill. Also very few candidates listed four life sustaining systems/skills.

Q8.2 Many diagrams of a cross-section of the spinal cord were large, neatly drawn and well labelled. Some drawings however lacked both the dorsal and ventral root. Many candidates described in detail the structure and function of the spinal cord.

Question 9: Photosynthesis

Q9.1 For questions 9.1.1 and 9.1.2, many candidates included a diagram of the cross-section of the leaf.

Q9.1.1 Candidates were able to give several different adaptations of the leaf for photosynthesis. Some candidates erroneously explained the position of leaves on the plant e.g. little overlapping of leaves. Such answers were not awarded marks as candidates had to relate to the structure of the leaf and not of the plant.

Q9.1.2 Several candidates described the roles of the xylem and phloem tissues in the transport of water and sucrose. The fact that there is a unidirectional flow of water from the roots to the leaves and a bidirectional flow from the source of products of photosynthesis to the parts of the plant that do photosynthesise was insufficiently mentioned.

Q9.2 There were several very detailed answers on the light dependent and light independent reactions of photosynthesis.

Question 10: Cells

Q10.1 Very few candidates correctly defined the cell. Many answers did not reflect the actual definition of a basic unit of structure and function of life.

Q10.2 Answers to this question varied from a correctly labelled diagram of a prokaryotic cell with correct functions of the structures of this cell to incorrect diagrams of eukaryotic cells. Moreover, some candidates also gave diagrams of both animal and plant cells. While many of the latter were correctly drawn and labelled, marks could not be awarded as a eukaryotic cell is not the simplest form of a cell.

Q10.3 There were many correct answers. Some candidates had the misconception that all unicellular organisms are prokaryotic organisms and eukaryotic organisms are all multicellular.

Q10.4 The vast majority of candidates were unable to state two correct advantages of multicellular organisms.

Q10.5 Several candidates were unable to explain properly the importance of surface area to volume ratio. Some were unable to write down the correct term using surface ratio or volume ratio instead of surface area to volume ratio. Some confused this concept with surface area of exchange surfaces and did not list the importance of volume.

Question 11: Insulin

Q11.1 Answers to this question were mainly correct.

Q11.2 The majority of candidates stated the correct organ that is responsible for insulin production.

Q11.3 In this question, candidates mainly wrote correct but partial answers. Some candidates did not list all the organs/tissues that are targeted by insulin and therefore did not explain the effect of insulin on the particular missing organ/tissue.
Q11.4 A substantial number of candidates gave a detailed description of the procedure of the biotechnological production of human insulin. In the formation of recombinant DNA, several candidates named enzymes involved in reverse transcription and DNA polymerisation. However few candidates described the importance of markers to identify the transformed bacterial hosts carrying the recombinant DNA plasmids.

Chairperson

2016 Examination Panel