

UNIVERSITY OF MALTA

**SECONDARY EDUCATION CERTIFICATE
SEC**

BIOLOGY

May 2016

EXAMINERS' REPORT

**MATRICULATION AND SECONDARY EDUCATION
CERTIFICATE EXAMINATIONS BOARD**

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**SEC Biology
May 2016 Session
Examiners' Report**

Part 1: Statistical Information

The Table below shows the distribution of grades for the May 2016 session.

GRADE	1	2	3	4	5	6	7	U	ABS	TOTAL
PAPER A	95	136	226	251	145	-	-	186	9	1048
PAPER B	-	-	-	35	40	83	41	201	20	420
TOTAL	95	136	226	286	185	83	41	387	29	1468
% OF TOTAL	6.5	9.3	15.4	19.5	12.6	5.7	2.8	26.4	2.0	100.0

Part 2: Comments regarding candidate's performance

Paper I

Question 1	
a.	Most candidates answered this correctly.
b.	Most candidates answered this correctly.
c.	Generally correct though often incorrectly spelled.
d.	Most candidates answered this correctly.
e.	Though often correct, a common mistake was confusion with reflex arc.
f.	Often marks were lost when the candidates failed to specify the type of pollination.
g.	There were various answers given to this question, most common referring to the nitrogen cycle and names of bacteria. It is important that candidates read the question properly and answer accordingly rather than provide specific examples to explain a concept.
h.	Most candidates answered this correctly.
i.	Frequent confusion with the general term 'thermoregulation'. It seems that candidates are aware that the temperature in the body needs to be kept constant however, a constant internal environment is not limited to temperature.
j.	A common mistake was 'breathing'. This was considered incorrect and very inaccurate since the phrase given on the exam paper specified the rib movement.
Question 2	
a.	Calculating the surface area was rather confused by the candidates who often failed to multiply the area of one face by six. Also, the units of both surface area and volume were often omitted. Though an average number of candidates were able to produce a ratio, rarely were they able to reduce the volume to 1.
b.	Most candidates answered this correctly.
c.	This question was often mixed up with the organisation in the body from cells – tissues- organs and systems. Marks were only awarded when specialisation of cells with reference to specific functions was mentioned.
d.	Often candidates were not able to clearly and accurately explain structural characteristics of xylem vessels. The presence of lignin was frequently mentioned but other descriptions were very simplistic, including 'long' 'tubes', 'wide' 'thick'. Rarely was a mention of empty lumen, absence of cytoplasm, absence of cross walls and continuous tubes. A very frequent incorrect answer was a reference to 'valves that prevent backflow of water', probably due to the nature of the diagram provided. This was confused with other structures studied during the biology course.
e.	The function of xylem vessels was often incorrect. Rarely was 'support' mentioned. Instead, very often the term 'turgidity' was used. In plants, support and turgidity should not

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		be used interchangeably since while xylem provides support due to the lignin deposits, turgidity in plant cells is a matter of water content in the cell. Other simplistic statements related to structure, keeping upright were considered incorrect.
Question 3		
a.		Often correct. A common mistake happened when candidates did not carefully answer to the given letters and considered X to be below W.
b.		The characteristic was very often correct however, in frequent cases, the explanation was not accurate, sometimes not related to the characteristic given. Also, it was clear that candidates confuse and use interchangeably the terms 'surface area' and 'surface area to volume ratio'. Structure of red blood cells as 'disk' and 'donut' were not so rare and were considered incorrect.
c.		Most candidates were aware that after blood donation, there is less oxygen circulating in the blood. Often the reason candidates provided was not specific to a loss of red blood cells, but a generalised loss of blood. The further explanation that less oxygen leads to a slower respiration and less energy produced was frequently omitted. Another very common misconception was that blood carries energy.
d.		Most candidates answered this correctly.
Question 4		
a.		Often correct. De-starching refers to putting a plant in the dark. Thus statements such as 'putting the plant away from sunlight' or 'in the shade' were not accepted.
b.		The role of ethanol was often known by the candidates but the water bath was sometimes omitted.
c.		Most candidates answered this correctly.
d.		Most candidates answered this correctly.
e.		The idea of a control experiment frequently appeared in the candidates' answers explaining that there needs to be a comparison among the leaves.
f.		A common mistake in this question was that the candidates labelled on the leaves the presence of absence of starch, failing to answer to the question which required them to show the result after the test for starch. Many times, the candidates failed to notice that the given leaf was a variegated leaf, where the white parts will not stain positively for starch even when all the conditions required for photosynthesis were present.
Question 5		
a.		Often correct.
b.		Often correct.
c.		Very rarely was the pollen nucleus mentioned as the plant male gamete. Often pollen or pollen grain was given as an answer.
d.		Often correct. The term vegetative propagation was often mentioned but also often incorrectly referred to such as vegetative production, vegetative reproduction.
e.		Often correct though sometimes candidates described differences in numbers leaving out the size.
Question 6		
a.		Most candidates mentioned presence of mammary glands or similar terminology however the second characteristics was not based on a visible characteristic as indicated in the question – with one of the most common answers being 'give birth to live young.'
b.		Once again a number of candidates did not include a characteristic shown in the diagram making the first column answer incorrect. Most candidates identified the correct phylum with few writing Monocot or Dicot for the plants. The animal displayed was very often mixed up for a mushroom which is clearly the wrong

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		answer since the Kingdom was given to be Animal.
c.		A number of candidates answered this wrongly. With answers discussing the presence of jointed appendages in insects and the absence in humans.
Question 7		
a.		A considerable number of candidates did not include a key and/or the axis label on the graph drawn. A large number of candidates read the wrong values in the table and so the plot was not correct since glucose was depicted as being the least component with urea being the most abundant component.
b.		Correctly answered by most candidates.
c.		Most candidates gave the correct answer to the first part of the question in which they had to mention that urea in the artery is greater than in the vein. However the same cannot be said for the second part of the question since either no explanation was given or when given few candidates mentioned what happens in the kidneys rather than the dialysis machine.
d.		Answers were mostly incomplete since candidates did not mention that proteins are broken down to amino acids before mentioned deamination and once in the kidneys filtration was omitted and excretion was mentioned straight away.
Question 8		
a.	i	A number of candidates only mentioned that proteins are a source of energy and did not specify that this only occurs in starvation circumstances. Also a considerable amount of candidates just mentioned that it is used for growth and repair. This statement is considered as one reason.
	ii	Some candidates mentioned the use of Iodine Solution turning to blue black in the presence of proteins whereas others mentioned the Benedict's test. Few candidates mentioned the reagent needed however failed to mention the colour change expected if proteins were present.
	iii	Most candidates answered this correctly.
	iv	Most candidates gave the correct deficiency disease.
b.		Correctly answered by most candidates.
c.		A number of candidates did not give effects related to the natural marine ecosystem. One of the most common wrong answers was overfishing.
d.	i	A considerable amount of candidates defined the term <i>endotherm</i> as being a warm blooded animal which is wrong. The definition should have been that the organism is capable of maintaining a constant internal environment irrespective of the external environment.
	ii	This was answered correctly by most candidates. The most common answers being the presence of gills and fins.
Question 9		
a		Mostly answered correctly.
b	i	A number of candidates gave the correct answer however a number of candidates did not mention the terms predator and prey.
	ii	A number of candidates wrote that deforestation increased air pollution. This was wrong since the question clearly asked how the construction may lead to air pollution.
c	i	Answers to this question were somewhat divided, with candidates giving the correct answer in saying that burning of fossil fuels, hence carbon dioxide in air, traps heat and causes global warming. However a number of candidates talked about the effects of CFC's on the ozone layer instead. The latter cause ozone depletion.

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	ii	Most candidates gave correct answers to this question with a couple mentioning using CFC free products and fitting cars with catalytic converters were not awarded any marks since these do not reduce the carbon dioxide in the air.
Question 10		
a.		Answered correctly by the majority.
b.		Answered correctly by the majority.
c.		Most candidates gave a food chain including 4 trophic levels. Some candidates presented food chains with 5 trophic levels, others drew a pyramid instead which was totally wrong.
d.		Some candidates got mixed up with which organism/s is the prey and which the predator, so a number of incorrect answers were given.
e.		A good number of candidates managed to get full marks in this question, with few losing a mark since they forgot to include the rabbits in their calculation. Some others got a totally wrong answer since they calculated the 3 rd trophic level probably confusing it with secondary consumer.

Paper 2A

Question 1		
a.		Few candidates managed to score full marks in this question. Many candidates used the term area instead of habitat.
b.		Most candidates answered this question correctly.
c.		Most candidates answered this question correctly.
d.		Most candidates correctly referred to increased water loss as being the main disadvantage. Many candidates incorrectly stated that absence of a cuticle allows more light to be absorbed and did not refer to absorption of water over the entire plant surface.
e.		Most candidates correctly concluded that absence of lignified tissue limits plant growth but few candidates gave a correct reason for this observation.
f.		None of the candidates concluded that a large number of sites would give results that are more representative of the whole population. The majority of candidates stated that different sites have different abiotic factors and hence a comparison could have been made of the types of mosses growing in different areas.
g.	i	Many candidates answered this question correctly.
	ii	Many candidates answered this question correctly.
	iii	Many candidates stated that bryophytes can only survive in humid habitats because water is needed for photosynthesis.
Question 2		
a.		Most candidates answered this question correctly.
b.	i	Most candidates answered this question correctly.
	ii	Most candidates answered this question correctly.
c.		Most candidates answered this question correctly.
d.		Most candidates answered this question correctly.
Question 3		
a.		Most candidates answered this question correctly.
b.		A lot of candidates stated that villi have a large surface area without explaining how this is achieved.
c.		Most candidates lost a mark due to the inadequacies in the diagram.
d.	i	Most candidates answered this question correctly.

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	ii	Most candidates answered this question correctly.
	iii	Most candidates answered this question correctly although some used the term excretion to refer to the process by which undigested material is eliminated from the body.
e.		Most candidates answered this question correctly.
f.		Most candidates gave at least 3 of 4 adaptations expected.
g.		Most candidates answered this question correctly.
h.		Most candidates answered this question correctly.
<p>Question 4 General comments: Least popular question. Answers given were generally confused with little order or train of thought. The statements of the question were not analysed properly and broken down into distinct parts to be tackled separately and fully.</p>		
a.		None of the candidates gave a reason why the alien seaweed <i>Caulerpa taxifolia</i> grows at twice the rate of local seaweeds. The point was almost always disregarded. Most of the candidates focused their answer around the use of chlorine, but gave little theoretical support as to why chlorine was used in the past. Very few candidates referred to the use of the sea slugs as biological control; with frequent and incorrect use of the term 'biological pesticide.'
b.		The first part of the statement about the importance of supply of food to humans was typically ignored. The second part of the statement dealing with the harmful effects of agricultural practices and animal husbandry was instead the main focus of the majority of the answers. However, the examiners notice that in most of the cases, candidates lumped human impact and any possible pollution attributed to human activities in their answers irrespective if the example fitted the situation at hand. Very few candidates applied their knowledge to answer the problem posed by the statement.
c.		The answers were generally correct but very often incomplete due to insufficient detail in the explanation.
d.		Overall confused and incorrect answers as the majority mistook the characteristics of the three different types of 'worms' presented in the question. A typical and very common mistake is identifying roundworms as 'round' (spherical) instead of the correct 'round in cross-section'.
e.		The majority of the candidates failed to identify with reasons, snails as molluscs and millipedes as arthropods in the first part of the statement. In the second part of the statement, a significant majority of candidates failed to identify the different characteristics used to distinguish between different arthropod taxa resulting in incomplete answers.
<p>Question 5</p>		
a.	i	Generally correct but in some cases incomplete due to the lack of a justification.
	ii	Generally correct. A number of candidates commented about fair testing without specifying why drying of the eggs before weighing lead to this. The examiners wish to draw the attention of the following point: the justification (reason) of a procedural precaution should be an integral part of the presentation of a precaution. Therefore, it needs to be supported by theoretical knowledge or a sound reason.
b.		The answers were generally correct for solutions A and B but generally partially correct for Solution C. The predominant mistake in the last part was that candidates excluded that osmosis was taking place between isotonic solutions when in reality the osmosis occurs but in equal measure in opposite directions leading to an overall/net zero change in mass. In addition, some answers were still referring to 'strong' and 'weak' solutions which are obsolete terms often commented against in past SEC Biology reports. Candidates are encouraged to explain osmotic movements either in terms of water potential or concentrated/dilute solutions instead.
c.		In the majority of cases, candidates failed to refer to the surface area to volume ratio. Worryingly a significant portion of the answers related size of the egg to a larger amount of water.

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d.		The answer stating the fate of the red onion epidermis in solution A was generally correct. Most of the answers used the correct term 'turgid'. However, the answers pertaining solution B results often referred to shrinking and shrivelling, which would be correct if the specimen was of animal origin.
e.		The answers varied widely with no definite pattern. Some identified and gave a fairly accurate representation of a plasmolysed cell. A significant portion of candidates drew the result of solution B on an egg cell which was not at all included in the question. In a significant portion of answers, the cell membrane of the plasmolysed cell was identified / labelled incorrectly.
f.		The examiners note that a number of candidates very often gave an observation but this did not lead to a conclusion, which should be informed by theory. To clarify this point, the vast majority observed that more water is lost from the lower surface but very few candidates concluded that therefore there are more stomata situated on the lower surface. The same applies to the upper epidermis and the relevant conclusions.
g.		The question was generally misread and misunderstood as a significant portion of the candidates choosing this question referred to long roots avoiding the proper question of how plants living in dry conditions are adapted to prevent water loss and not gain water.

Question 6

a.	i	Most candidates answered this question correctly.
	ii	Most candidates answered this question correctly.
	iii	Generally incomplete. Candidates very often did not make any reference to secretion into the bloodstream first with the eventual transport to the hypothalamus as blood flows. The second part about transport was generally correct. A worrying portion of the candidates referred to transfer through nerve cells.
	iv	This question was often misunderstood as very few candidates referred to the importance of food in humans and hence the balance between eating and not eating, between receiving sufficient nutrients and energy to keep the individual going.
	v	The answers were generally incomplete. Very few candidates identified the target organ for glucagon as the liver. The examiner wishes to draw the attention to a very important point, which was a pervasive mistake. Hormones either stimulate a process or inhibit a process from happening in a cell/organ. The vast majority of candidates referred to the hormone as the substance which actually brings the change, in the case of insulin as a catalyst, which changed glucose into glycogen. This idea should be correctly expressed as insulin stimulating liver/muscle cells to change glucose into glycogen.
b.	i	Most candidates answered this question correctly.
	ii	Generally incorrect. The majority of candidates could not distinguish between autosomal and sex-linked disorders.
	iii	Generally incorrect. The vast majority of candidates could not relate the LEP gene with the genetic sequence carrying the information guiding the production of the leptin protein.
	iv	Most candidates answered this question correctly.
c.		Generally incorrect. The question was about the basic distinction between a dominant and a recessive allele.

Question 7

a.	i	Most candidates answered this question correctly.
	ii	Overall correct but in many cases the maximum marks could not be awarded due to confusion or partially correct answers. One of the most common mistakes was identifying prokaryotes as not having a nucleus but then at the same time stating that like eukaryotes they have membrane bound organelles (in other cases the exact opposite of this idea).
b.	i	The name of the system was generally correctly identified but a significant proportion of candidates gave an incorrect name on the lines of the Carolus Linnaeus Naming or equivalent. The second part about the advantage of the naming system was generally correct.
	ii	The kingdom was in the majority of cases correctly identified. The second part was generally partially correct due to confusion between plant and yeast

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		characteristics. There was no common pattern of mistakes.
	iii	Same as b.ii. (Second part).
c.		Most candidates answered this question correctly.
d.	i	Generally incomplete with little reference to homogeneity or evenness or an equivalent expression to indicate that the yeast has been properly mixed with the ingredients to ensure a uniform rise or action.
	ii	Most candidates answered this question correctly.
e.		Generally correct but in a significant number of answers incomplete, often omitting the use of restriction enzymes, or use of ligase, the formation of a recombinant DNA and the insertion into bacteria. The most common pattern was the omission of these technical terms.

PAPER 2B

Question 1		
a.		A number of candidates drew the graph on squared paper instead of 2mm grid scale paper, inverted the axis, did not join the plots using straight lines and failed to include the title. Many candidates chose inadequate scales.
b.	i	Most candidates answered this question correctly
	ii	Most candidates answered this question correctly
c.		Many candidates failed to give the correct answer - NaHCO_3
d.		Very few candidates knew that only one variable needs to change in order to have comparable results
e.		Most candidates failed to mention emulsification of fats to increase the SA for enzymes to work on.
f.		Many candidates gave the correct answer however failed to use the correct biological terms detoxification and deamination .
g.		Most candidates failed to explain the reason.
h.		Most candidates did not know the answer and many of those who attempted it incorrectly stated hepatic vein instead of hepatic portal vein .
Question 2		
a.		Most candidates did not know how to define ' <i>species</i> '.
b.	i	Most candidates answered this question correctly.
	ii	Most candidates gave 1 correct answer.
c.		Many candidates stated that the function of rhizoids is absorption of water/minerals instead of anchorage.
d.		The majority of candidates did not know that lignin strengthens the cell wall. Most knew that its absence restricts the size however, failed to give the correct reason.
e.		The majority of candidates did not know the answer.
f.	i	The majority of candidates did not know the answer.
	ii	The majority of candidates did not know the answer.
g.		Many candidates did not understand the question.
Question 3		
a.		Most candidates stated no absorption of nutrients instead of less absorption of nutrients, also, failed to explain that it is due to reduced SA of the villi.
b.		Many candidates mentioned only 1 or 2 adaptations.
c.		Most candidates had a vague idea of the shape of a villus and failed to include three labels.
d.		Many candidates used the term wastes instead of faeces .
e.		The majority of candidates did not know the answer. Those who attempted it stated

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		cellulose-digesting enzymes instead of the cellulose- digesting bacteria.
f.		Many candidates did not understand the question.
g.		Many candidates did not know the answer.
Question 4		
General Comment:		
The majority of candidates scored very low marks in this question		
a.		Only a few candidates managed to mention the term 'biological control'
b.		Many candidates repeated what was stated in the statement – to provide food – and failed to explain the harmful effects such as deforestation, soil erosion, overuse of fertilizers and persistent pesticides.
c. & d.		Very poor answers indicate that the majority of candidates do not have a clear idea of 'Classification'. Few managed to understand and consequently state the characteristic features and major differences between the phyla of invertebrate animals.
Question 5		
a.	i	Several candidates misinterpreted the contribution of shell removal to the final weight reading and not to the water movement in and out of the egg.
	ii	Most candidates were aware why eggs were dried before weighing but the use of poor English left a lot to be desired.
b.		Once again, due to poor English, the explanation for each result was either incomplete or not fully comprehensible.
c.	i	All possible incorrect variables were listed. Most of the time there was no distinction between flaccid and plasmolysed.
	ii	Most answers included the correct shape and organelles of a plant cell. Candidates are not aware that the cell-membrane detaches from the cell-wall but the latter retains the original shape.
d.		A significant amount of answers did not relate water loss to transpiration.
e.		Candidates tend to be familiar with adaptations of xerophytic plants.
f.	i	The majority of candidates are unable to name the cells that transport the products of photosynthesis. Several answers incorrectly included xylem together with phloem. Others mentioned other plant cells.
	ii	Even though a word equation was requested, several candidates wrote a chemical equation. The reagents and products included in the equation were mostly incorrect.
	iii	The green leaf part was mostly correctly recognised as having more chlorophyll pigment but no reference was made to the increased amount of light captured.
Question 6		
a.	i	Most candidates failed to refer to amino acids as the monomers of protein.
	ii	Most candidates did not write the correct definition of a hormone. Several answers included irrelevant information.
b.	i	Majority of candidates correctly mentioned the brain as the organ hosting the hypothalamus. Few incorrectly referred to 'head' as the organ. The function of the hypothalamus was mostly inaccurate.
	ii	A wide variety of incorrect methods were mentioned namely 'by hormones', 'by nerves' and others.
	iii	Most candidates stated correctly that food provides energy.
c.	i	Only few candidates included all the details required. Most of the time glucagon and insulin action were confused.
	ii	As above
d.	i	The term 'mutation' was mostly misinterpreted for a generic mistake in the body with no reference to change in the base sequence of a gene.
	ii	Candidates were unable to distinguish between autosomal and sex-linked disorders. Most managed to provide few details about sex-linked diseases rather than genetic disorder. Majority of candidates were not familiar with the term autosomal.
	iii	Candidates correctly described the harmful effects of obesity.

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Question 7		
a.	i	Majority of candidates were aware of at least one basic difference between viruses and bacteria, most mentioning that viruses are border-line between living and non-living and bacteria are completely living.
	ii	Several candidates mixed up the term prokaryote with eukaryote and listed incorrect or irrelevant differences.
b.	i	A significant number of candidates listed at least one benefit of the binomial system.
	ii	The kingdom to which yeast belongs to is mostly unknown and confused with Monera/Bacteria or Protists.
	iii	Differences between cells were mostly inaccurate, either referring to irrelevant structures or wrong aspects.
c.		Even though a word equation was requested, several candidates wrote a chemical equation. Reactants and products identified were generally incorrect.
d.		Answers were generally incorrect. Both the order of events as well as the description of each step in the simple genetic engineering process was mostly incorrect.
Question 8		
a.		Most candidates did not label all parts of the female reproductive system correctly. Few terms were clearly invented.
b.	i	The definition of meiosis was often incomplete.
	ii	A significant percentage of candidates correctly identified the ovum as the cell produced by meiosis in females.
c.	i	Definition of ovulation was generally incomplete.
	ii	Definition of menstruation was mostly inappropriate stating that 'monthly bleeding/period in females'
d.		Most candidates are not aware that fertilisation occurs in the fallopian tubes.
e.		All answers to this question were incorrect since the graphs provided were completely irrelevant.
f.		Several candidates are aware that cigarette smoke create gases once burnt but are not aware of their effects.
g.		All answers were irrelevant as they did not refer to the 'process of fertilisation.'

**Chairperson
2016 Examination Panel**