

UNIVERSITY OF MALTA

**SECONDARY EDUCATION CERTIFICATE
SEC**

BIOLOGY

May 2014

EXAMINERS' REPORT

**MATRICULATION AND SECONDARY EDUCATION
CERTIFICATE EXAMINATIONS BOARD**

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SEC Biology May 2014 Session Examiners' Report

Part 1: Statistical Information

The Table below shows the distribution of grades for the May 2014 session.

GRADE	1	2	3	4	5	6	7	U	ABS	TOTAL
PAPER A	84	143	208	249	139			205	10	1038
PAPER B				37	46	83	59	205	29	459
TOTAL	84	143	208	286	185	83	59	410	39	1497
% OF TOTAL	5.61	9.55	13.89	19.10	12.36	5.54	3.94	27.39	2.61	100

Part 2: Comments regarding candidate's performance

Paper I

General comments

Question 1		
a.	i - v	Most candidates answered this question correctly. Some candidates labelled the air space as a spongy mesophyll cell. Some candidates were not able to copy the labelled terms correctly.
b.		Most candidates answered this question correctly. Many candidates spelled the term 'guard' incorrectly.
c.	i	Many candidates said that stomata open for the leaf to absorb sunlight.
	ii	Many candidates said that stomata close because the plant will not photosynthesise during the night.
d.		Most candidates answered this question correctly.
Question 2		
a	i	Many candidates failed to underline the scientific name.
	ii	Most candidates answered this question correctly.
	iii	Many candidates ignored the fact that the characteristic feature quoted should have been derived from the passage and instead quoted features of mammals which were not mentioned in the passage.
b		Most candidates answered this question correctly.
c	i	Most candidates answered this question correctly.
	ii	Most candidates answered this question correctly.
	iii	Many candidates incorrectly stated that the jaw of herbivores exhibits a circular movement.
d		Most candidates answered this question correctly.
Question 3		
a	i	Most candidates answered this question correctly.
b		Many candidates did not refer to water loss and instead stated that closure of the spiracles prevents the entry of harmful substances including pathogens. Others stated that closing of the spiracles prevents the entry of food into the tracheae and hence prevents choking. Others said that this adaptation prevents insects from drowning.
c		Many candidates referred to the fact that chitin 'gives strength and support' or that chitin

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		keeps the tracheae open. Those that correctly stated that chitin rings prevent the trachea from collapsing failed to say that this allows flow of air through the system.
d		Most candidates answered this question correctly.
Question 4		
a	i	Most candidates answered this question correctly.
	ii	Most candidates answered this question correctly.
b		Most candidates answered this question correctly.
c		Most candidates answered this question correctly.
d		Most candidates answered this question correctly.
Question 5		
a	i	Most candidates answered this question correctly
	ii	Most candidates answered this question correctly.
b		Many candidates answered this question correctly. A considerable number of candidates stated that clay/clayish soil retains more water.
c		Most candidates answered this question correctly.
Question 6		
a		Generally correct.
b		Generally correct.
c		Generally correct.
d		Most candidates failed to mention that small endotherms have a high surface area to volume ratio leading to a high rate of heat loss. The answers given were mixed but mostly lacked biological knowledge.
e	i	Name of the phylum was misspelt in a significant number of answers.
	ii	The question made reference to a 'distinctive feature' of earthworms. Earthworms are definitely segmented but so are arthropods. Candidates are encouraged to answer carefully so that the feature given is truly distinctive.
f		Generally incomplete. The majority of candidates gave only one beneficial aspect to obtain two marks. A significant number of candidates simply copied the information given in the diagram without elaborating the point any further.
g	i	Photosynthesis produces glucose or organic compounds. Most candidates made reference to the production of food which the autotrophic organism then consumes. This incorrect reference needs to be addressed.
	ii	Generally correct. However, the examiner points out that round and round in cross-section are not the same identical point. Candidates need to be aware of the difference to correctly refer to the shape of organisms in cross-section.
Question 7		
a		Generally correct.
b	i	Mostly incorrect. Most candidates failed to explain why the statement is incorrect. Many did not make any reference to the idea that a fully permeable membrane allows any molecule to pass through. A significant number of candidates showed to have a completely incorrect idea as they highlighted the idea that a fully permeable membrane does not allow any molecule through.
	ii	Generally correct.
c	i	Generally correct.
	ii	Incorrect in the majority of answers. Candidates failed to understand the difference between a description and an explanation. Most answers made reference to the movement of water by osmosis out of the potato cylinder. The correct answer should have made reference to a decrease in mass, ideally accompanied by the percentage decrease.
	iii	The solution was correctly identified in most cases. Full marks were rarely awarded to the

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		second part of the question entailing the reason. The large majority of candidates stated that no osmosis takes place in an isotonic solution. This is incorrect as theory states that in an isotonic solution, the amount of water leaving the cells is equal to the amount of water gained by the cell. There is definitely no net movement but this is different to stating that there is no movement.
Question 8		
a	i	Generally correct
	ii	Generally correct. Some candidates made reference to cell division leading to healthy bodies. Candidates need to be aware of the correct use of the term healthy as it is most often misused.
b	i	Generally correct.
	ii	Generally incomplete. A mutation is a change in the base sequence of a gene and not simply a change in a gene or a DNA molecule. The change needs to be specified.
c		Many candidates failed to reason that a fast multiplication rate leads to a rapid increase in numbers with cancer cells outcompeting normal cells or inducing a rapid spread of the cancer cells in other parts of the body. A significant number of candidates did not understand completely the term 'cancer site' and were referring to how the cancer would appear at the surface of the body / from the outside to the naked eye.
Question 9		
a	i	Many candidates failed to describe the changes appropriately. A smaller left ventricle volume was often described simply as: narrowing of the ventricle, short ventricle or equivalent answers. A high number of candidates referred to the thicker ventricular wall as a result of HCM as a deposit of fat in the heart blocking blood flow.
	ii	General consequences on blood flow were generally correct. A proportion of candidates were not thorough in their descriptions. In some cases the flow of ideas was not logical; starting with a decrease in volume of blood in the ventricle and ending with a weak flow, instead of a reduced flow.
b	i	Generally correct.
	ii	Generally correct.
c	i	Generally correct.
	ii	Generally correct.
Question 10		
a		Generally correct. Some candidates failed to draw correct direction of the arrows. Some others, failed to place the first trophic level at the bottom of the food web.
b	i	Generally correct.
	ii	Generally correct.
	iii	Most candidates made reference to fish and mussels eating the contaminated phytoplankton but the idea of bioaccumulation was overall ignored. Very few candidates made any reference to it.
c	i	Generally correct but a significant portion of candidates made reference to nitrifying or nitrogen fixing bacteria instead of saprotrophic bacteria in general.
	ii	Generally correct.

Paper 2A

Question 1		
a.		The majority of candidates named the process correctly. This was not the case for the equation. Some equations contained a mixture of words and formulae. Most candidates, who opted to write the chemical equation, wrote each formula correctly. Both the terms alcohol and ethanol were accepted.

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b	i	An average number of candidates mentioned the blocking of stomata. The prevention of uptake of carbon dioxide was less cited. Some candidates referred to gaseous exchange in general and not carbon dioxide. A significant amount of answers included light not being able to reach the leaves. There was no mention of digestion of leaves or physical and chemical damage to cells.
	ii	Full marks were seldom awarded as there was almost no reference to how the hyphae of <i>Botrytis</i> release enzymes which digest the grape.
c		Parasites have been defined really well, with both mention of the living host and the damage to it. Some candidates also applied the definition to identify what is the parasite and the host in the context mentioned in the question.
d	i	Some candidates were penalised as they still do not mention a membrane-bound nucleus, but just nucleus.
	ii	The most common answer was the presence of chloroplasts in the palisade cell, these being absent in the downy mildew cell. Presence of hyphae, which was mentioned at times, was not accepted. A minority of answers did not feature a comparison.
e		Most candidates answered correctly. The incorrect answers were due to confusing phloem with xylem. Some answers were quite general and included 'transport of food'. Some others included the mention of glucose.
Question 2		
a		Some graphs were drawn on squared paper, in spite of clear instructions in the question. Histograms were sometimes drawn and an improper scale was chosen by some candidates making it difficult to correct the plotted values. Unlike other years, title and labelling of legends were included.
b		In spite of the question asking for a comparison, some candidates explained the general trend of the total fertility rates.
c		A high rate of correct answers for this question. A common mistake was the reference to the hormone progesterone.
d	i	Most answers were correct. Candidates were not awarded full marks when they just mentioned the release of the ovum and failed to mention from the ovary. The Graafian follicle was mentioned in a significant number of answers.
	ii	There was a variety of ranges that were mentioned. Ranges 12-16 and 14-18 were not awarded full marks. No marks were awarded to answers which did not specify the number of days. Only a limited amount of answers were completely off, showing that students know when ovulation occurs.
Question 3		
a		Most candidates answered correctly.
b	i	Common mistakes for this question included the Central or Peripheral Nervous System.
	ii	Sensory neuron was almost always cited. In a significant number of answers, there was the mention of the relay neuron as the intermediate neuron. Even though the situation under study involves a monosynaptic reflex, with no relay neuron, there were no marks deducted for this. The neural pathway was complete in most answers, with some also depicting the pathway.
	iii	A high number of correct answers. When there was a mistake, this was due to the omission of the timely response and mention only of the prevention of damage.
c	i	The majority of candidates did well in this question, showing that they know this part of Biology well. A very small number of students confused the secretion of insulin when there is a low glucose level instead of high. Islets of Langerhans in the pancreas were mentioned often. Muscles were never mentioned as the target organ.
	ii	Mechanism was described well by most candidates. A minority of candidates confused glycogen with glucagon. Quite a number of students referred to homeostasis.
d	i	Most answers were correct.
	ii	Some candidates may not have been familiar with the term 'property' and this reflected in the low quality of answers presented. Indeed some candidates just copied from the text of the question.
	iii	Full coherent answers were seen for this question, at times complete with a full labelled

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		diagram.
	iv	Candidates applied their knowledge to this question and most candidates also were awarded full marks for this question. Marks were deducted for candidates who did not mention straight upwards.
Question 4		
a		Most of the answers were not specific and described that the enzyme 'breaks down' the egg white making no reference to 'proteins' and to the resulting 'soluble products'.
b	i	Fair testing was known by the majority of candidates.
	ii	Most candidates failed to mention the term 'surface area' but described the concept in their own words.
c	i	Optimum temperature was known by most candidates but the idea that the water bath keeps temperature 'constant' was not as common.
	ii	Accuracy was a very common answer but most candidates failed to link the concept of 'surface area'.
d	i	Very often correct
	ii	The idea that enzymes are 'denatured' was known by the majority of candidates however they rarely explained what happens to the structure of the enzyme when it is denatured.
e		Again, most candidates were aware that enzymes are specific but failed to further explain what this means in terms of active sites.
f		Some candidates were confused by this question. Some answered in terms of enzyme X or in terms of the different pHs.
g		The most common answer was that pepsin acts on proteins. However, a good amount of candidates referred to the activity of pepsin in the stomach and the help of HCl.
h	i	Often correct
	ii	In the majority, the candidates mentioned the specific chemicals needed to test for proteins rather than the Biuret test. These were considered correct.
Question 5		
a		The idea that the Binomial system is Universal, offers no language barriers and avoids confusion was known by the majority of the candidates.
b		Often correct
c	i	Sometimes candidates referred to the fern NOT having a waxy cuticle. This was considered incorrect. Sometimes, candidates explained that ferns 'reproduce by spores' This was also considered incorrect since it was not accompanied by a proper explanation.
	ii	Often correct
d	i	Often correct. Sometimes candidates gave details of carpel and anthers as parts of the flower needed for reproduction.
	ii	Few candidates were able to explain this properly.
e	i	Sometimes candidates confused this question and described the roots or seed structure rather than the leaf. Often when drawing the leaf, candidates failed to make all the necessary labelling and marks had to be deducted.
	ii	Often correct
f	i	Often correct
	ii	Candidates are often unable to make correct comparisons. For example Has 6 legs and the other doesn't – this was considered wrong. Has 6 legs, and the other has no wings – this was considered wrong.
	iii	Presence of shell was known by the majority of candidates.
Question 6		
a	i	Most candidates gave only 1 reason for this. Sometimes it was not correctly explained.
b	i	Candidates generally identified a 'short term' effect correctly.
	ii	In this question, some candidates tended to give explanations which were not considered

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		a 'long term' effect. Also, often the answers were not clearly explained but simple statements like 'it becomes extinct'. The ideas of predator and prey populations were not commonly observed in these answers.
	iii	Drainage was very often used instead of 'sewage' ; these are not the same concept. Quite often the idea of plastic bags thrown in the sea appeared.
c		The idea of 'burning fossil fuels' seldom appeared but names of gases emitted from the ships were common. These were awarded one mark.
d	i	The idea of radiation was rarely used. The majority of candidates mentioned the sun's rays and marks were deducted for this. The idea of protection was often used.
	ii	CFCs was a common answer. The most common incorrect answers were methane and carbon dioxide.
	iii	The idea of skin cancers was very common. However, other answers were rarely observed. A common incorrect answer was 'the melting of the ice- caps' and 'global warming'.
e	i	The idea of large areas of rock, aromatic plants with examples and dry environment were common answers.
	ii	Destruction of habitats was mostly mentioned
f	i	Most candidates were unable to answer this question.
	ii	Most candidates were unable to answer this question.
Question 7		
a		The idea that the filtrate changes was very common. Most candidates mentioned reabsorption giving details of what happens along the nephron.
b		The term 'excretion' was used by an average number of candidates. Sometimes it was used without a context thus failing to explain the term. Sometimes excretion was confused with egestion and a description of waste food was given. This was considered incorrect. Very often candidates mentioned either the organ or the waste product but rarely did they mention them in pairs with a proper description.
c		The most common mistake here was that candidates wrote about pancreatic amylase and failed to give information about salivary amylase and reasons why it acts only in the mouth.
d		Often correct though the idea of the concentration gradient was not commonly observed.
e		Here, the majority of candidates mentioned surface area but wrote about it in terms of villi, which was not what was required for this question.
f		Most candidates explained that break mould is a 'heterotrophic plant', thus correcting half of the given wrong statement. The idea of 'saprophytic' appeared often. On average, the candidates mentioned the idea of hyphae though an explanation of external digestion was not so common.

PAPER 2B

Question 1		
a.		Most candidates plotted an adequate bar chart. However a number of candidates still ignore the clear instruction to use the 2mm scale graph provided, and consequently obtain no marks for this question. A number of candidates still confused bar charts and histograms.
b		The simple calculation was generally worked well.
c		Candidates generally referred to the general decrease in the total fertility. Some candidates ignored the increase in fertility rate between 1980 to 1990.
d		<i>Only a minimum number of candidates replied correctly to the simple recall questions related the pituitary gland, luteinizing hormone and different chromosome number in a zygote and ovum</i>
	i	Only a minimum number of candidates correctly referred to the pituitary gland.

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	ii	Many candidates incorrectly mentioned oestrogen instead of luteinizing hormone
	iii	Many candidates incorrectly identified 24 chromosomes in the ovum as compared to 48 in the zygote.
e	i	Generally answers were correct.
	ii	The diagram showing the structure of a typical insect-pollinated flower was generally drawn adequately and labelled clearly. However some candidates simply drew an artistic impression or a diagram of a flower with no labels.
f		Generally candidates failed to describe clearly the fruit characteristics and the related function. A number of candidates referred to the pollination process indicating a clear misunderstanding of the seed dispersal concept.
Question 2		
a - f		Very often candidates managed to identify the mistake (or part of it) in each of the statements given, however failed to provide adequate explanation/s based on sound biological concept/s.
Question 3		
a		Majority of candidates managed to identify the breakdown of protein as the cause of length reduction.
b	i	Fair testing was often cited as the reason for maintaining an egg white strip length.
	ii	Candidates referred to the temperature i.e. 37°C – as the best temperature for the enzyme to work in. Few used the terminology expected i.e. 'optimum temperature'.
c		Candidates identified pH 2 as the optimum pH of enzyme Q.
d		Some candidates identified that enzymes work only on specific substrates; however they did not mention the active site.
e		Many candidates mentioned denaturation as a consequence of boiling however failed to mention that enzymes lose their structure in the process and consequently will not act on the substrate.
f	i	Many candidates incorrectly mentioned the pancreas as the organ producing enzyme Q (pepsin).
	ii	Candidates often correctly identified the low pH as evidence that enzyme Q is indeed pepsin.
	iii	Generally answered correctly
g	i	The four elements present in all proteins were mostly correctly mentioned; however a number of candidates misunderstood the question completely and mentioned some carbohydrates such as glucose.
	ii	The Biuret test and corresponding colour change were only correctly mentioned by few candidates. Many candidates incorrectly cited the test for starch (iodine test) or the test for sugar (Benedict's test).
Question 4		
a	i	Several answers were correct. However eutrophication was mostly linked to leaching of chemicals from soils rich in fertilizers. Few candidates linked the process to the release of untreated sewage into the sea.
	ii	The majority of candidates gave partial answers to this question. Many candidates just described the development of an algal/ plant bloom. They failed to identify that competition and the increase in decomposers as the determining factor leading to biochemical oxygen demand.
	iii	Mainly correct as most candidates related the reduction in oxygen to a decreased animal survival.
b	i	Few candidates recognised the importance of air acting as a thermal insulator. Indeed they only mentioned that birds will get stuck with oil and consequently cannot fly.
	ii	Many candidates explained correctly the changes in a food web as a result to a decrease in breeding.

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	iii	The loss of habitat and loss of other organisms were often cited as the two main ecological effects resulting from oil spills.
c	i	The majority of candidates who attempted this question mentioned carbon dioxide as their main answer. Reference to oxides of nitrogen and sulphur was completely lacking.
	ii	Many candidates were unable to describe the term pollution superhighway in biological terms. Candidates related a large number of ships to the 'pollution super highway' definition however failed to list the use of oil /non-renewable fuel sources as contributors to air pollution.
d	i	It is evident that a number of candidates still confuse the ozone-layer and its effects with the process of global warming.
	ii	The main correct answer to this question was an increase in skin cancers. Only few candidates mentioned the absorption of the sun's UV radiation and the related increase in skin cancer. Other effects caused by a reduced ozone-layer such as the increase in eye cataracts, decrease in plant growth and change in plant life-cycles and marine ecosystems were not evident. Candidates often mentioned incorrect consequences of a reduced ozone-layer, particularly melting ice caps and global warming.
Question 5		
a	i	Mainly correct
	ii	Some candidates gave the correct word equation of alcoholic fermentation.
	iii	Answers to this question were rather poor. Several candidates simply wrote that yeast is present to make dough rise without giving an explanation.
b	i	Many candidates were unable to describe the appearance of a stoma.
	ii	Some candidates were able to arrive to the conclusion that when stomata are blocked then the carbon dioxide uptake decreases. Candidates who answered correctly to this question usually answered also correctly questions aii and bi.
	iii	Most answers to this question were incorrect.
c		Several correct answers.
d	i	Many candidates did not recognise the fact that a bacterial cell is a prokaryotic cell while a fungal cell is a eukaryotic cell.
	ii	Several correct answers.
e	i	While many candidates gave the correct answer to the plant tissue which transports sugars i.e. phloem, the majority of candidates did not give two correct regions that receive sucrose.
	ii	Mainly correct.
	iii	Many candidates were able to list two correct functions of water in a plant. The main function listed by candidates was water as a reagent in photosynthetic reactions.
Question 6		
a		Some candidates gave a correct answer to this question.
b		Some candidates gave at least one correct structural feature. Many candidates gave one answer as "plants are green" without mentioning the presence of chloroplasts or of photosynthetic pigments.
c	i	Very few candidates answered correctly to this question.
	ii	This question was poorly answered although few candidates mentioned the absence of vascular bundles in bryophytes.
d	i	Many candidates were unable to list the reproductive structures of gymnosperms and angiosperms.
	ii	Mainly incorrect.
e	i	While many of the diagrams were correct, candidates labelled the network venation of a dicot and the parallel venation of a monocot but failed to label the description of the leaf itself i.e broad (dicot) and long, narrow (monocot).
	ii	Several correct answers to this question.
f	i	Many candidates were unable to give two correct characteristics of arthropods.
	ii	Several candidates gave one correct structural feature which distinguishes a spider from

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		an insect mainly the number of jointed appendages.
Question 7		
a		Mainly correct
b	i	Diagrams of a reflex arc presented by candidates were generally poor with incorrect labelling and shoddy drawings.
	ii	The direction of nerve transmission was generally incorrect when drawn by the candidate.
	iii	Many candidates gave the correct answer of preventing harm to the organism.
c	i	Mainly correct.
	ii	Several candidates explained correctly the role of insulin and glucagon in homeostasis.
d	i	Generally correct
	ii	Few candidates were able to explain properly the growth of coleoptile C.
	iii	Some candidates drew correct and well labelled diagrams of phototropism.
	iv	A number of candidates were able to deduct that the region of most growth is the region which contains the highest amount of plant hormone.
Question 8		
a		Few candidates gave the correct name of the process depicted in picture A. The process resulting in menstruation was poorly described. A number of candidates gave the name of the process depicted in picture B simply as metamorphosis and did not specify the type of metamorphosis shown. Very few candidates gave the correct names of the stages of complete metamorphosis. Answers to the name and process of picture C were mainly incorrect.
b	i	Candidates who attempted this question gave the biological importance of roots. They did not recognise the fact that the picture had nitrogen fixing root nodules and thus did not explain the mutualistic relationship between the nitrogen fixing bacteria and legume roots.
	ii	Many candidates gave a brief description of photosynthesis as a result of the trees at the top of the field terraces. Few candidates explained the importance of the dense tree canopy to prevent soil erosion. Candidates did not mention the term terracing.

**Chairperson
2014 Examination Panel**