

UNIVERSITY OF MALTA

**SECONDARY EDUCATION CERTIFICATE
SEC**

BIOLOGY

May 2015

EXAMINERS' REPORT

**MATRICULATION AND SECONDARY EDUCATION
CERTIFICATE EXAMINATIONS BOARD**

SEC EXAMINERS' REPORT MAY 2015

**SEC Biology
May 2015 Session
Examiners' Report**

Part 1: Statistical Information

The Table below shows the distribution of grades for the May 2015 session.

GRADE	1	2	3	4	5	6	7	U	ABS	TOTAL
PAPER A	78	134	209	234	134			193	9	991
PAPER B				36	41	76	46	192	17	408
TOTAL	78	134	209	270	175	76	46	385	26	1399
% OF TOTAL	5.58	9.58	14.94	19.30	12.51	5.43	3.29	27.52	1.86	100

Part 2: Comments regarding candidate's performance

Paper 1

General Comments

Question 1		
a		In the majority of cases, only one cell was correctly identified. Some candidates identified these cells as animal cells failing to realise that they possess a cellulose cell wall and therefore falling in the group of plant cells.
b		In a significant number of cases, candidates failed to provide a comparative answer to the second part of the question and lost the relative marks. Many failed to comprehend the question, which sought knowledge 'other than the features in the flow diagram'. This meant that answers repeating information in the diagram to point out one similarity and one difference were rejected.
c		Generally correct
d	i	A significant number of answers were either incomplete or incorrect. Many candidates failed to distinguish between surface area and volume. Surface area relates to the stretch of uppermost layer (surface) over which diffusion occurs, whereas volume is refers to the internal space available to be 'filled'. It was important to realise that the absence of a nucleus provides more volume or space for haemoglobin, and a greater proportion of this molecule therefore meant a higher oxygen carrying capacity of the red blood cell around the body The best answer included reference to a surface area to volume ratio that combines both principles.
	ii	Generally incorrect. The idea that mitochondria are the site for aerobic respiration was significantly absent. Answers were ridden with misconceptions of the like: mitochondria produce energy. Such ideas are not acceptable on two counts: a) energy is not 'produced' (the language in this case needs to change) and b) mitochondria produce ATP
	iii	Generally correct. A significant number of candidates however confused mitosis with binary fission.
Question 2		
a		Generally correct.
b	i	Generally correct.
	ii	The identification of the turgid cells is generally correct. The biological reason behind it was often incomplete as candidates failed to mention that the cells absorb water and hence become turgid.
c	i	Generally correct. The examiner wished to point out strongly the following point. All forms of transport require energy even passive transport including diffusion. Without energy there is no driving force. It is the source of energy and the reason for its expenditure, which is different in the several forms of transport across membranes. Hence stating that active transport requires energy without specifying the form is partially incorrect and insufficient, even at SEC level. Candidates should be taught that active transport involves the movement of substances from a low to a high

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		concentration (or against a concentration gradient) using ATP. The board of examiners recommend that this standard will be used in future sessions.
	ii	The examiner reports a significant number of incorrect answers. The direction of osmosis with underlying reason was often incorrect with some candidates pointing out that water moves from the vacuole into the cytoplasm (and therefore not exiting at all).
Question 3		
a		Generally correct.
b		Generally correct.
c		Partially correct. In the majority of cases only one monosaccharide was correctly identified.
d		Generally incorrect. Enzymes can be re-used over and over again. This simple concept was almost completely absent in the majority of scripts.
e		Generally incorrect. A significant portion of the answers was also incomplete. Many candidates failed to give a simple sequential logical answer. A higher temperature causes the molecules to speed up. This leads to more fruitful collisions between enzymes and substrate molecules increasing the overall rate of reaction.
f		Generally incomplete. Candidates failed to show that a higher temperature causes loss of enzyme structure and the substrate no longer fits into the active site. A significant portion of the candidates would simply indicate the loss of shape or equivalent.
Question 4		
a	i	Generally correct
	ii	Significantly incorrect. Many candidates failed to understand the objective of the question. The question made reference to the importance of species B producing a <i>large number of spores</i> . The answer should have made reference to increase the chances of survival or equivalent. Many candidates answered with reference to the importance of spore production instead ignoring the quantifying element of the question.
	iii	Generally incorrect. Candidates failed to use their knowledge of fern structure and adaptations to explain why these should not survive a dry environment.
b	i	A significant portion of incorrect answers, identifying Species A as a monocot giving a dicot feature to support the answer. Marks were lost as a result of the confusion between terms and characteristics.
	ii	Same as above.
c	i	Generally correct.
	ii	Generally incomplete. Most candidates omitted to state that root nodules contain nitrogen-fixing bacteria hence linking the nodules to nitrogen fixation.
Question 5		
a		Generally correct
b	i	Mostly correct. Some candidate failed to extrapolate the line to include the origin. Photosynthesis will definitely not be carried out in the absence of light.
	ii	Generally correct.
c	i	A significant number of candidates identified green light as the colour giving the lowest photosynthetic rate but then failed to support the answer with the evidence from the results given. Green light gave the lowest number of bubbles. No explanations were required.
	ii	Generally correct but the answers given in a significant number of cases were not in line with the instructions of the question. Candidates repeatedly fail to analyse and comprehend the question correctly. The question enquired about the number of bubbles in a case where carbon dioxide doubled in unit concentration. The answer needed to be supported by a reason. A significant number omitted the reason altogether or gave lengthy sentences without ever giving a reason. It was also important to use theoretical knowledge that photosynthetic rate is subject to a number of variables and unless these are properly illustrated one cannot conclude that doubling the carbon dioxide concentration automatically doubles the photosynthetic rate. The candidates were expected to indicate that such an increase in the reactant gas will cause an overall increase in the rate of the process.

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Question 6		
a		Most candidates answered this question correctly.
b		Most candidates answered this question correctly.
c		Most candidates answered this question correctly.
d		Most candidates scored only one of two marks because even though they associated the folds with an increased surface area, many failed to refer to the fact that this allows a large number of neurons to develop and more neuronal connections to form.
e		Most candidates answered this question correctly.
Question 7		
a	i	Most candidates answered this question correctly.
	ii	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		Few candidates demonstrated awareness that CO ₂ , being a greenhouse gas, traps heat in the atmosphere and prevents it from escaping from the earth thus causing the temperature of the earth to increase. Many associated CO ₂ with ozone depletion and went on to say that this allows UV rays to enter the atmosphere causing an increase in atmospheric temperature.
e		Many candidates answered this question correctly.
Question 8		
a		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.
e		Most candidates answered this question correctly except for the last part. Many wrote the genotype or the terms homozygous dominant, heterozygous and homozygous recessive when prompted to give the offspring phenotype.
Question 9		
a		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.
e		Many candidates referred to the presence of hairs in the nose and mucus along the respiratory tract. However several misconceptions were evident in the answers provided including: the idea that cilia trap bacteria, the idea that ciliated cells secrete mucus. For many, the hairs in the nose are synonymous with cilia.
f		The majority of candidates said that the ribcage expands during inhaling. Very few went on to say that this has the effect of increasing the chest volume and lowering the pressure such that air is sucked into the lungs.
g		The majority of candidates successfully identified at least two effects that emphysema has on a smoker's health. Several candidates misinterpreted the question and listed effects of smoking, with many of them quoting lung cancer as the principal effect of smoking.
Question 10		
a		The majority of candidates correctly stated that strip-cropping reduces soil erosion but very few candidates referred to other benefits of this practice such as the facts that it protects growing crops from damage by wind-borne soil particles, or that it reduces the spread of disease or that it prevents that particular nutrients get depleted.
b		Many candidates demonstrated awareness that lead can have adverse health effects if contaminated plants are consumed by humans. Few candidates referred to the possibility of lead contaminating the water table while others referred to the phenomenon of bioaccumulation. A considerable number of candidates assumed that lead is an essential nutrient for plant growth and these checks ensure that the soil is

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		not lacking this nutrient.
c		Many candidates stated that the Simar nature reserve prevents bird species from becoming extinct. A considerable number of candidates referred to the fact that such nature reserves provide a resting ground for some species of migratory birds.
d		Many candidates correctly said that CFCs were responsible for the depletion of the ozone layer. However they incorrectly associated this phenomenon with global warming.

Paper 2A

Question 1		
a		Most candidates were able to define the term extinction. It is very important to explain to candidates that a definition refers to a meaning rather than to an example of. For example a definition such as 'this is as happened to dinosaurs and the dodo' is unacceptable.
b	i	Though answers were often correct, a common mistake was that the excretory products belonged to the <i>Pisonia tree</i> .
	ii	Correct
c		Correct
d		Often correct
e		A very common mistake was that when birds die, they will not eat the seed thus allowing it to germinate. Nowhere in the given passage was there reference to this. The idea of decomposition was rarely mentioned.
f		Often correct. However, it was evident that candidates have difficulty to express themselves correctly when explaining this. Candidates are expected to use terms such as 'universal' or 'known worldwide' rather than explaining that 'latin is a dead language which only scientists can understand'. Sometimes candidates wrote whole paragraphs to explain this, most of which was irrelevant.
Question 2		
a		The question clearly specified the use of the 2mm grid scale. Thus, any graph drawn on different graph papers was penalised. The questions specified that the two graphs needed to be drawn on the same axis. Sometimes this was ignored. The question clearly instructed candidates to join the points with straight lines. Again, marks were deducted when this was ignored. Candidates were expected to do a legend (key) to distinguish between the 2 graphs. Very often this was left out and candidates wrote the words sucrose and alcohol to label each line. This was penalised as it provided careless work not expected at this level.
b		Often correct. However, often candidates were penalised when they did not write the units.
c		Often correct
d		Very often candidates failed to realise that a high level of alcohol kills the yeast and thus gas production stops.
e		Most candidates were aware of the role of yeast in making the dough rise. Sometimes terms such as 'wake up', 'grow' were used but it is expected that candidates are able to explain the procedure in correct English. However, sometimes, candidates wrote whole paragraph about the action of yeast failing to mention the production of carbon dioxide gas and alcohol. Even more uncommon was the mentioning that alcohol evaporates in the oven.
Question 3		
a	i	The presence of chloroplast and flagellum was often mentioned.
	ii	Most candidates explained that water enters the cell from a hypotonic to a hypertonic solution but sometimes the term osmosis was not mentioned.
	iii	Though the idea that the contractile vacuole stores food appears in the answers, a majority of candidates explained the answer correctly, with all the necessary detail.
	iv	In this question, the candidates were expected to show knowledge of surface area to volume ratio. Often they explained their small size and short distance travelled by gases but the explanation was often incomplete.

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b	i	Often correct
	ii	Often correct
	iii	Many candidates failed to understand the question and gave a very lengthy description of the process happening in the nephron.
c	i	Often correct. A common mistake resulted when candidates gave a difference that was not structural such as 'carry oxygenated blood'.
	ii	The idea of the presence of haemoglobin to carry oxygen around the body was common. However, the term oxyhaemoglobin was sometimes absent.
	iii	The idea that valves prevent the backflow of blood was a common answer. The second answer given was often incorrect. When candidates mentioned that veins have a wide lumen, the reason was always wrong. Many candidates mentioned that the position of the body (for example legs up amongst others) affects the flow of blood back to the heart.
d	i	A variety of food sources were mentioned. These were often correct. It is important to point out that when asked about a source of food, candidates are expected to mention foods that are 'rich in' the asked nutrient.
	ii	Often correct
e	i	Often correct
	ii	Very often a correct lifestyle was mentioned. Stress and salty foods were accepted as correct answers, however, the explanation given were incorrect. Even when smoking was mentioned, a correct explanation of how it leads to high pressure was incorrect. Obesity was not considered as a lifestyle.
Question 4		
a		Most candidates mentioned respiration. However, often photosynthesis was given as an answer.
b		Often correct
c		Often correct
d		Generally correct. However, the graphs provided were often not precise. Sometimes the axes were swapped and very often the temperature graph did not reach a plateau.
e		Often correct
f	i	Often correct. Marks were deducted when the units were omitted.
	ii	Often incorrect. Most of the candidates were unable to measure the rate from the given graph.
g	i	Often incorrect. Sometimes candidates were able to link recombinant DNA to genetic engineering. However, a correct definition was rare and most answers were out of point.
	ii	Often incorrect. It was clear that candidates were unaware of the importance of vectors. At times candidates gave a physical definition of vectors.
	iii	Often correct.
	iv	Very often the answer was incorrect because candidates linked auxin to phototropism failing to mention that it is required simply for growth. In this case it was clear that candidates failed to apply a concept to this particular situation.
h		Often correct. Answers that did not describe behavioural adaptations were considered incorrect.
i		Often correct
Question 5		
a	i	Often correct
	ii	Often correct
b		Though very often candidates know the correct cycle and mentioned egg-larva-pupa-adult, a correct description of each stage was often omitted or lacked the necessary information required. Most marks were lost here. Some candidates still confuse the term 'larva' with caterpillars and sometimes 'nymphs' which is completely incorrect in this case.
c	i	The pollen is often described as 'the male gamete' when in fact it 'contains the male gamete'. The idea of it being haploid was rarely mentioned.

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	ii	Very often, marks were deducted when the answer was not underlined. It must be made clear to candidates that the binomial names need to be underlined.
	iii	Often correct
	iv	Often correct
d	i	Often correct. Sometimes candidates fail to provide a comparison for example insects have 2 pairs of wings and arachnids have a body divided into two parts. This is considered incorrect.
	ii	Often correct
	iii	Often correct
	iv	Often correct
Question 6		
Although the majority of candidates attempted this question, the performance left much to be desired. Answers were often incorrect or lacked detail.		
a.		Most candidates suggested that 'some viruses and bacteria cause disease'. Generally candidates were not able to explain why all viruses cause disease. Role of bacteria in mutualistic and symbiotic relationships were mentioned correctly, as well as the role of bacteria in biotechnological processes. However some of the biotechnological processes mentioned involved yeast rather than bacteria.
b		Although several candidates suggested that bacteria are cellular microbes, they were not able to support their statement with a correct explanation. Several incorrect answers suggested that the genetic material in bacteria is surrounded by a protein coat, a cell membrane, a cell wall or a slime capsule.
c		Generally answers and explanations were correct here.
d		Generally answers were correct. Explanations were also correct but lacked necessary detail.
e		Answers were generally incorrect. Several candidates suggested that the cow is not a ruminant. Those who stated that it was a ruminant, however often gave incomplete explanations to support their statement. Reference to hind gut fermenters was rarely included.
f		Generally a correct statement was written. However explanations were not correct, particularly due to the use of the terms 'warm blooded' and 'cold blooded' – terms that are no longer used!! The use of these terms was rampant and must be immediately be addressed. Majority of candidates did not refer specifically to the ability or inability to maintain a constant internal temperature. Other incorrect answers reflected that candidates were not familiar with the term 'ectothermic' and thus tried to distinguish between them using taxonomical criteria.
Question 7		
a		Most candidates answered this question correctly.
b	i	Majority of answers were correct. Incorrect responses included unspecified reference to 'addition of alkali.'
	ii	Answers generally lacked detail. Root hairs were rarely mentioned. Generally candidates referred to use of active transport to absorb mineral ions but did not mention diffusion. Lengthy, but irrelevant, descriptions of active transport were often included in answers.
c		Several candidates answered this question well.
d	i	Answers were generally correct.
	ii	Answers were generally correct.
	iii	Most answers were correct. However several answers referred to need of air in soil to allow 'plant' to respire rather than referring specifically to the 'root'.
e	i	Vast majority of answers were correct.
	ii	Most answers were incorrect, often suggesting that the plant would be 'completely submerged' under water and thus would 'drown'.
	iii	Most candidates referred to the addition of a named organic fertilizer correctly however they never mentioned tilling.
f		Several answers were correct or partially correct. The misconception that 'algae take up oxygen from the marshland' was often encountered.

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Paper 2B

Question 1		
a	i	Most candidates answered correctly. A common incorrect answer was budding.
	ii	Most answers were correct. Most students mentioned both an advantage and a disadvantage.
b	i	Only a minority of candidates mentioned the presence of starch.
	ii	The sample of questions that were corrected included no correct answer for this question.
c	i	Most diagrams were not up to standard. A large number of candidates lost marks for the drawings. The labels were correct in a significant number of cases.
	ii	Incorrect answers included the ovary and the uterus.
	iii	No candidate mentioned the presence of ciliated epithelia in the fallopian tube. The presence of hair was mentioned. The wafting movement towards the uterus was also observed for only a small amount of candidates.
d	i	Candidates answered correctly except for a handful that mentioned the thorax.
	ii	A large number of candidates left this answer empty. Only a small number of those who attempted to answer correctly stated the diaphragm and gave the correct function.
	iii	Incorrect answers for this question were noted. A common mistake was to give the duration of the menstrual cycle, or stating every 28 days.
	iv	A number of candidates just mentioned the name of the hormone. A number of candidates incorrectly mentioned progesterone.
e		Some candidates mentioned the functions of the amniotic sac rather than the placenta.
Question 2		
a		The most common mention was the performance of photosynthesis. A number of candidates used words from the question. The most common were 'It is a tropical tree', and because of the 'favourite nesting site for the warbler'.
b		For this question, common mistakes included mentioning rare to find and almost all dead. Some candidates mentioned plant or animal rather than an organism.
c	i	There was no mention of metabolic wastes. A common mistake was the mention of faeces or undigested material.
	ii	A small amount of candidates obtained half the marks allotted for this question due to no correct answer.
	iii	This question was attempted by most candidates, though not all pyramids were correct.
d	i	A number of candidates described insect pollination rather than pollination in general. There was confusion between the terms of the flower parts.
	ii	There was confusion between the terms of the flower parts. Most candidates mentioned the tube that goes down and the fusion of the nuclei. Terms of flower structure were often confused.
e		Most answers to this question were correct.
f		Most answers were correct for this question. The most common was the inability for birds to search for food and to escape predators.
g		Almost all candidates answered that the bird will not eat the seeds. Since this was recurrent in many scripts, it shows a misconception.
Question 3		
a		Most answers were correct. Some candidates also mentioned brewing.
b		Most answers were correct.
c		Some candidates lost all marks when they did not plot their graph on the graph paper given. Some candidates also used an incorrect scale, example taking the values in the table and inserting them in the graph.
d		The majority of candidates who plotted their graph correctly answered correctly within the range.
e		A correct answer was observed for those candidates who attempted this question.
f		No marks were awarded for this question largely due to non-attempt and incorrect

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		answers.
g	i	Some candidates just mentioned a function for the three structures without mentioning the structure itself, thereby already losing half the allotted marks.
	ii	Incorrect answers included Protista and Bacteria.
	iii	An incorrect comparison included 'one is square the other is circular'. Candidates knew about the presence of a cell wall in yeast but did not mention chitin.
Question 4		
a	i	Not all candidates attempted this question.
	ii	Most answers were correct.
	iii	Most answers were correct. For this question some candidates also gave examples with animals.
b	i	Mechanical digestion was very often included with ingestion.
	ii	The mention of the stomach was commonly mentioned in all candidates' answers.
	iii	This question was very often incorrect.
	iv	This question was mostly not attempted.
	v	There was reference to waste and excretion for this question.
c	i	Half the marks were often allotted as most candidates mentioned the killing of the prey.
	ii	Incorrect answers for this question included 'the meat is already broken down after biting'.
Question 5		
a	i	A large number of candidates described scavenger as a 'hunter'.
	ii	Incorrect answers commonly included Insects instead of the Phylum Arthropod.
b		The cycle was often incomplete. Statements were more often than not absent in the answers provided.
c	i	Only a small amount of answers were correct.
	ii	Most names were not underlined, subsequently the candidates lost half a mark.
	iii	Most answers by candidates who attempted this question were correct.
d	i	Comparisons were often not done properly. Presence of jointed legs was commonly mentioned.
	ii	This question was either not attempted or was incorrect.
	iii	This question was either not attempted or was incorrect.
e		There was no mention of Emphysema in this case. No candidate was awarded the full 3 marks allotted for this question.
Question 6		
a		Majority of candidates were not able to define homeostasis. Reference to maintenance of 'constant internal conditions' was frequently overlooked. Some answers were just limited to thermoregulation.
b		Diagrams were often sketchy and lacked detail. Frequently renal blood vessels or the ureter were not included. Candidates rarely pointed out the position of the nephrons.
c	i	Candidates generally answered this question well.
	ii	Most answers were incorrect or irrelevant.
	iii	Partially correct answers were often presented. Renal vein was often not mentioned.
d	i	Vast majority of answers were correct.
	ii	Vast majority of answers were correct.
e	i	Majority of answers were correct.
	ii	Most answers were correct.
Question 7		
a		Most candidates did not answer the question well as they referred to photosynthesis.
b		Generally answered incorrectly as candidates referred to importance of enclosing the plant (rather than the pot) in a plastic bag.
c		Vast majority of answers were correct.
d		Although the environmental factor was generally named correctly, the graph sketched was generally incorrect. This was mainly due to swapped labelling of axes or incorrect shape of curve.
e		Candidates generally were not able to answer this question well.

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f	i	Vast majority of answers were correct.
	ii	Majority of answers were incorrect as the rate was not calculated.
	iii	Most answers were correct.
	iv	The structural adaptations of xerophytes were generally named correctly. However explanations were often incorrect or lacking.
g		Although candidates correctly identified two mechanisms observed when the human skin reacts to overheating, most were not able to explain their role in maintaining a constant body temperature. The misconceptions that 'blood vessels rise up towards the skin surface' or 'capillaries vasodilate' were frequent.
Question 8		
a	i	Several answers were correct.
	ii	Several answers were correct.
b		Few candidates answered this question correctly. Reference to biological pest control was often lacking. Answers generally repeated the information included in the statement in the question.
c	i	Practically none of the candidates defined the term recombinant DNA, giving the impression that they had not encountered the term in their studies.
	ii	None of the candidates could explain the use of vectors in genetic engineering, giving the impression that they had not encountered the concept in their studies.
d	i	Although several candidates suggested that bacteria are cellular microbes, they were not able to support their statement with a correct explanation. Several incorrect answers suggested that the genetic material in bacteria is surrounded by a protein coat, a cell membrane, a cell wall or a slime capsule.
	ii	Generally answers were correct. Explanations were also correct but lacked necessary detail.
	iii	Generally a correct statement was written. However explanations were not correct, particularly due to the use of the terms 'warm blooded' and 'cold blooded' – terms that are no longer used!! The use of these terms was rampant and must be immediately be addressed. Majority of candidates did not refer specifically to the ability or inability to maintain a constant internal temperature. Other incorrect answers reflected that candidates were not familiar with the term 'ectothermic' and thus tried to distinguish between them using taxonomical criteria.

**Chairperson
2015 Examination Panel**