UNIVERSITY OF MALTA

SECONDARY EDUCATION CERTIFICATE

SEC

BIOLOGY

May 2007

EXAMINERS' REPORT

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD

SEC Biology
May 2007 Session
Examiners' Report

Part 1: Statistical Information

General Performance

A total of 1800 candidates sat for the Biology SEC examination in May 2007. The table below summarizes the general performance in the examination.

Table1. Summary of the general performance in the examination

Grade	1	2	3	4	5	6	7	U	Abs	Total
Paper A	92	139	238	280	165	-	-	132	6	1052
Paper B	-	-	-	56	112	126	107	318	29	748
Total	92	139	238	336	277	126	107	450	35	1800
% of Total	5.1	7.7	13.2	18.7	15.4	7	5.9	25	1.9	100

Part 2: Comments regarding candidates' performance

General Comments

1. Short or very short answers were observed.

2. Candidates are still not using marks as guidelines to the amount of information that the examiners expect. As a result, sometimes not enough information is given for a question of 4 marks and/or too much information is given for just 2 marks, which clearly shows that precious time was lost – time which could have been used somewhere else.

3. A relatively high proportion of candidates still equate the term animal to organism showing that a thorough understanding of the diversity of organisms is lacking.

4. Some candidates have considerable difficulty in overcoming the language barrier. In this session it was evident that some candidates did not understand the questions set and had considerable difficulties in expressing themselves well. Often examiners had difficulties as responses were unintelligible particularly in paper 2B.

5. Candidates must be able to use biological terms well and are expected to spell them well. Of particular interest was incorrect spelling of semen as *seamen*. The latter were then identified as agents that spread HIV virus!!!

6. Candidate performance was rather poor in drawing histograms and in questions related to practicals. Tutors must ensure that candidates really understand what they are doing when

participating in practicals and not just follow a set of instructions. Candidates should also be exposed to different methods of representing data in graphical form.

2.1 : Comments regarding Paper 1

Question 1

a. The majority of candidates answered this question correctly.
b. Several candidates confused meiosis with mitosis.
c. Many candidates failed to count the number of chromosomes in each gamete, properly. They generally failed to read and/or understand the question correctly. In fact most candidates answered 23 (i.e. the haploid number for human gametes), clearly showing memorisation.
d. The concept of fertilisation is clearly not grasped by the majority of candidates, thus many answered meiosis or mitosis!!
Candidates who sat for paper 2B generally omitted parts of this question.

Question 2

Many candidates failed to answer this question well and there seemed to be a general lack in their understanding of this topic.
a. Full marks were rarely awarded here, despite the fact that this question was mainly a recall question. Most of the candidates did not know the locations of the processes mentioned. The vast majority suggested that bile is produced in the gall bladder rather than the liver. Others mentioned parts of the body that are not part of the digestive system e.g. parts of the nephron in the kidney.
b. i) Most candidates did not mention that protein digestion continues in the small intestine. Some incorrectly suggested that it can be carried out in the liver by deamination. Generally answers lacked detail. Typically answers included statements such as *"enzymes are produced in the small intestine for protein breakdown."* At this level candidates are expected to know and list proteases secreted into the small intestines and their catalytic products. A small group of candidates used the term erepsin, the old nomenclature for peptidase. It is recommended that contemporary biological terms are used i.e. those used in the present textbooks.
b. ii) Most candidates answered this question correctly. Yet, the misconception that the gall bladder produces bile was evident once again. Several did not mention the process of emulsification.
c. Although most candidates realised that altering the shape of the villi can influence the absorption of nutrients, many failed to link reduction in surface area to efficiency of absorption. Some used the term re-absorption instead of absorption.

Question 3

a. Although the majority of candidates correctly identified renal fluid C as urine, they generally insisted that urine lacks protein and red blood cells. Thus they did not realize that following ultrafiltration, renal fluids always lack protein and red blood cells. Another common but incorrect response suggested that "proteins were re-absorbed" indicating that these candidates did not know the function of the Bowman's capsule.
b. Most candidates answered this question correctly. Others showed lack of knowledge of the composition of the glomerular filtrate, generally confusing it with blood.

c. Most candidates answered this question correctly. Some candidates confused the renal vein with the vein connecting the adrenal gland to the vena cava.
d. Many candidates were unable to distinguish between blood in an artery and in a vein. Furthermore several did not answer the question posed and just stated that the artery carries oxygenated blood whilst the vein carries deoxygenated blood. Candidates were in fact expected to compare relative concentrations of oxygen and carbon dioxide in blood plasma of arteries and veins. Reference to carbon dioxide levels was generally ignored.

Question 4
a. Several candidates answered this question correctly. Some candidates did not realise that the semi-permeable membrane allows only small water molecules to diffuse through. Hence they commonly suggested that the semi-permeable membrane was included *"so the two liquids do NOT mix."* Others found difficulty describing its role in the setup.
b. Answers were generally linked to the responses in part 4 a). Thus only candidates who had correctly identified the role of the semi-permeable membrane answered this question well.
c. Several incorrect answers were presented due to confusion of the definition of osmosis. A substantial number of candidates suggested that osmosis is the movement from "a *high concentration to a low concentration"*; one should note that when the term concentration is used, it is to define the amount of a solute in a solvent. Yet these candidates did not use the term concentration in this way. A group of candidates used a higher level definition of osmosis including the terms high and low *water potential*. Candidates opting for this definition generally presented correct answers.
d. Although candidates' understanding of osmosis is clear, most failed to apply the theory when asked about the intra-venous application of saline. Thus they did not realise that pure water dilutes the blood so much that red blood cells absorb water till they burst. In fact most focused on the presence of salt in the saline solution and linked it to dehydration, thus suggesting that saline is supplied to restore salt levels in blood. Also, a considerable number of the candidates who did link their answer to osmosis proposed that the cells of the tissues surrounding the blood vessels would burst and without referring to blood cells especially red blood cells.
e. i) Whilst most candidates answered this question well, several failed to mention that Benedict's test involves heating. A significant amount of candidates omitted this question. Could this indicate that they did not perform this food test in their course work?
ii) Most candidates mentioned the correct colour change expected in Benedict's test but overlooked the fact that a precipitate is formed.

Question 5
The majority of candidates did not understand this question.
a. i) Several incorrect responses were observed. Candidates (for some unexplainable reason) gave symbol X or Y i.e. the symbols used to represent the different students, rather than mentioning the left ventricle. Also several candidates suggested that the right ventricle has a thicker wall rather than the left.
ii) Most candidates did not answer this question correctly. The majority suggested "*tiredness"* as an answer and did not focus their response on blood circulation. Others linked the decreased pulse rate to heart conditions e.g. heart attack, rather to a general slowing down of circulation.

b. Several candidates answered this question correctly. Others gave the answers expected in 5 c) here, where they had to give only the physiological signs observed after exercise e.g. panting, sweating.
c. The majority of candidates failed to compare student X with student Y often referring to "a student" without saying whether it was X or Y. In addition for many candidates a fluctuating heart beat prior to an exercise is a sign of an untrained heart!
d. Several candidates answered this question correctly. Others confused "*pyruvic acid*" with lactic acid, and thus mentioned the first metabolite in their answer. The second part of the question was generally answered correctly.
e. Candidates generally presented incorrect answers, with most of them not knowing that carbohydrates are stored (as glycogen.) However candidates did use the term carbo-loading. Others gave completely incorrect answers stating that "*energy is stored"* or that there is a "*high energy content in the body"*.

Question 6
a. A large number of candidates failed to mention the presence of specialised neurons / nerve cells / receptors which make an organism sensitive to its surroundings and send information to the brain / CNS. Instead candidates suggested mechanisms associated with the maintenance of a constant body temperature such as shivering, sweating, vasoconstriction, vasodilation, contraction of pilo-erector muscles etc. Hence candidates were forwarding answers expected in parts (b) and (c) of this question.
b. i) The majority of candidates answered this question correctly. Additionally, some candidates mentioned the fact that sweat glands are inactive on cold days. Best answers were those which linked the cooling effect to evaporation of sweat. A minority of candidates suggested that skin secretes water rather than sweat.
b. ii) The majority of candidates answered this question correctly as almost all included insulation and reduction of heat loss. In some cases candidates said that the pilo-erector muscle erects rather than contracts.
c. A relatively small number of candidates scored full marks in this question. Whilst most candidates suggested that blood vessels narrow (vasoconstrict) in cold temperatures, only few linked it to reduction of heat loss through the skin. Furthermore few referred to the redirection of blood away from the skin. A large number of candidates suggested that during vasoconstriction, the blood vessels move away from the skin, sinking deeper into the body. This seems to be a common misconception.Yet markers are pleased to note that a substantial number of candidates correctly used the term vasoconstriction.

Question 7
a. Most candidates answered this question correctly. It is important to note that actually few candidates suggested the presence of two cotyledons in the seed. In fact several mentioned general characteristics of dicotyledon plants. Others suggested that 'They have two cotyledons' without explaining whether 'they' refers to the plants or the seeds.
b. i) The majority of candidates answered this question correctly. Presence of cones and needle-like leaves were amongst the most common answers. Only a few candidates gave a full detailed answer as regards the cones which contain seeds.

ii) The majority of candidates answered this question correctly. A small percentage of candidates (generally those sitting for paper 2B) suggested ways how to increase trees rather than how human activities contributed to the decline of trees. Others mentioned that Sandarac trees decrease as they are cut down to make paper or furniture. Unfortunately this is not applicable here. Others forwarded answers that were not specific e.g. deforestation.
c. Most answers were correct. Mistakes were due to giving typical characteristics of monocot plants, roots or flowers rather than their leaves, showing that candidates did not read and/or understand the question well.
d. i) The majority of candidates answered this question correctly. However several candidates were unable to spell the term Fungi correctly.
ii) The majority of candidates answered this question correctly. However, the terms mycelium and sporangium were not considered correct since they are not the exact structures asked for in the questions.
iii) The majority of candidates answered this question correctly. A small minority mentioned sporangiophore or spore case rather than spore.
e. The majority of candidates answered this question correctly. However, in several cases candidates referred to the saprophytic mode of nutrition of fungi without referring to the absence of photosynthetic pigment.
f. i) Several candidates confused the genus name with the species name. Those who identified the genus name sometimes did not write the name in a capital letter nor did they underline it. Others gave *Agriope lobata* or Arachnida for an answer. These responses showed that most candidates did not master the rules of the binomial naming system, a basic knowledge needed in classification.
ii) Candidates' responses were generally correct, except when detail was lacking e.g. stating that a typical feature of spiders is the "presence of many legs" or "more than 3 pairs of legs." Incorrect answers suggested that the body of spiders is divided into three regions or referred to presence of compound eyes.
iii) The majority of candidates answered this question correctly. Yet candidates were expected to emphasise that a larger web allows the spider to catch "more" prey rather than "to catch prey."
g. Only a minority of candidates scored full marks in this part of the question. A large number of candidates did not mention factors threatening Wied Għollieqa but suggested complex global threats such as global warming, melting of ice caps, acid rain and flooding – which will not only affect valleys themselves but the whole planet.

Question 8
a) Most candidates correctly identified and named the relevant parts of the brain, although some did confuse one part with another. However, most candidates gave general functions rather than specific examples of human activity associated with the part of the brain. This reflects candidates' inability to relate biological knowledge examined in this question to general human daily activity.
b) Candidates generally answered this question well, correctly giving the function of the hormone mentioned. A variety of hormones was mentioned, including FSH, Gonad stimulating LH, Growth hormone, ADH, TSH, oxytocin and prolactin. Markers were pleased to note that most candidates knew the full names of the hormones and not just their abbreviation. Common mistakes suggested that oestrogen and/or progesterone were produced by the pituitary.

Question 9

a. i) Few candidates answered this question correctly. Incorrect answers included barrier method, cap, IUD and diaphragm. Answers to part b. i) showed that candidates knew how this birth control method works but were unable to name it.

ii) Most candidates answered this question well. Although vasectomy was correctly mentioned, it was rarely spelled well.

b. i) Most answers were correct. However, a substantial number of candidates did not specify that spermicide kills sperm, and hence were awarded half the marks.

ii) Most answers were correct. Some candidates have a misconception that ejaculation does not take place with vasectomy.

c. The majority of candidates answered this question correctly. However some candidates mentioned another birth control method, without realizing that the question was referring to birth control methods 1 and 2.

d. i) The majority of candidates incorrectly suggested that the sheath (condom) is a reliable contraceptive as it prevents the transmission of STD's and infections. Another incorrect statement was 'it is 99% reliable/effective' without giving further reasons.

ii) The majority of candidates answered this question correctly. A minority of candidates indicated that a decrease in pleasure and fun is considered as a reason against. The word hole was very often seen as 'whole'.

e. Many candidates gave the cause rather than the effect of a high percentage of secondary school students having unprotected sex. The answers of such candidates included: lack of education, peer pressure, sexual pleasure, lack of condom distributing machines in schools. Risk of diseases was not considered as correct as candidate were expected to specifically mention sexually-transmitted diseases. Some effects mentioned include increase in birth rate and increase in social problems, indicating that candidates are aware of the problems related to teenage pregnancies.

Question 10

a i) Although candidates were asked to draw a plant-like protist, several named and drew the *Amoeba* which was incorrect. Very few candidates were awarded full marks due to insufficient labelling and not following rules when presenting a biological drawing. Many candidates shaded the nucleus and/or pigment spot.

ii) Several candidates failed to give a specific characteristic of protists e.g. suggesting that a nucleus or cytoplasm is present. Some suggested that protists are prokaryotic!

iii) The majority of candidates answered this question correctly. Some candidates said that the function of the contractile vacuole was 'to remove water' rather than "to remove **excess** water." Some candidates suggested that the contractile vacuole regulates the amount of water entering the cell. This is incorrect as the contractile vacuole actually regulates the amount of water that leaves the cell. Some candidates correctly suggested that the contractile vacuole prevents bursting of the cell.

b. i) Several candidates defined the term *parasitic* correctly. However some failed to indicate that the parasite harms the host whilst others did not refer to the parasite-host feeding relationship.

ii) Only a small minority of candidates gave a correct answer. Answers showed a general inability to apply principles of osmosis.

iii) Candidates sitting for paper 2A generally answered this question well, showing knowledge of pseudopodia in *Amoeba* or cilia in *Paramecium*. However candidates sitting for paper 2B generally named a protist without giving information on its type of movement.

2.2 : Comments regarding Paper 2A

Section A

Question 1

a. i) In most cases candidates did not show that Insects belonged to Phylum Arthropoda, and instead indicated that Insects belong to other groups. Incorrect answers included phrases such as *"body has abdomen"*, an incorrect response most probably copied from the text. Others suggested that the body is "*divided into segments"* which although correct is not a characteristic of arthropods or insects only.

ii) Several candidates answered this question correctly. Others suggested the presence of wings and/or antennae without specifying the number of pairs (especially for antennae) characteristic of the insect class. Paper 2A candidates are expected to show this level of detail.

b. Several candidates answered this question correctly however a substantial percentage failed to link the fact that body marks similar to those of the wasp also meant danger due to implied presence of a sting. Incorrect responses generally mentioned camouflage. On the other hand the examiners are pleased to note that a relatively high proportion mentioned the term mimicry in their response.

c. Most candidates were unable to distinguish between nectar and pollen. Many were unaware that the pollen grain contains the male gamete. Most did not know the function of nectar.

d. i) Several candidates answered this question correctly. Incorrect answers focused on the insect rather than the pollen exine as the question suggested. Others suggested that pollen in wind-pollinated flowers is lighter than that in insect pollinated flowers, completely ignoring the fact that they were expected to compare the exine.

ii) Whilst most candidates answered this question correctly, others just stated that stamens in wind-pollinated flowers are limp (or rigid in insect-pollinated flowers) without referring to the fact that they hang out of the flower (or are within the flower if insect-pollinated).

e. Most candidates answered this question well. Some did not realize that insects generally do not visit wind-pollinated flowers but are attracted by the bright insect pollinated flowers.

Question 2

a. Candidates' performance in drawing histograms was extremely poor!! In many cases the scale chosen was not adequate. The main mistakes were incorrect plotting of the bars particularly by failing to separate the two bars representing one region from the others. A number of candidates erroneously plotted total individuals with HIV/AIDS in millions instead of % of total infected. A few candidates plotted line graphs instead of histograms whilst others plotted the two histograms on completely different axes. In many cases candidates wrote in ink and in the majority of cases incorrect labelling was observed. Furthermore a title and/or a key/ legend were generally absent.

b. i) The majority of candidates answered this question correctly.

ii) The majority of candidates answered this question correctly.

c. The majority of candidates answered this question correctly.

d. Several candidates confused sperm with semen. Saliva was frequently but incorrectly mentioned as a mode of transmission of HIV.
e. The majority of candidates answered this question correctly, however in several cases the diagram was rather small.

Section B

Question 3
a. The majority of candidates answered this question correctly. Yet candidates frequently suggested that long, deep-running roots are developed to reach for underground water. However cacti tend to have shallow roots that spread out close to the surface to absorb any rain as efficiently as possible.
b. i.) Candidates rarely used the presence or absence of gametes to distinguish between sexual and asexual reproduction. More stress should be done on this basic difference. Many candidates suggested incorrect answers such as: "*asexual having sex with itself*," or "*the individual has both sexes*" etc.
ii) The majority of candidates answered this question correctly. Most mentioned budding and binary fission and even included a diagram to represent them. Some candidates incorrectly identified the proglottid of the tapeworm (*Taenia)* given as an asexual mode of reproduction.
c. i) Several candidates were unable to define the term *biological control* and often suggested that it was a pesticide. Others, whilst suggesting that it is a natural method did not refer to the need of a predator to control the pest which is also its prey.
ii) The majority of candidates answered this question correctly. Often they suggested that the prickly pear is well adapted to the dry, arid conditions and that the typical asexual reproductive mode helps to spread it rapidly. Few candidates mentioned that most animals did not graze on the prickly pear due to its spines.
iii) Candidates' answers were either perfectly correct or completely incorrect.
d) Several candidates answered this question correctly, often complimenting their answers with diagrams. The main difficulty lies in defining incomplete metamorphosis where candidates often did not mention that the nymph is a miniature adult.
e) Candidates' answers were either perfectly correct or completely incorrect.

Question 4
a. The majority of candidates presented excellent answers. Some answers were rather intelligent and creative. Fish farming and reduction of fishing quotas were often mentioned. Although one should be cautious how to interpret "reducing the number of fishermen!!"
b. i) Candidates generally showed a good understanding of the impact of the construction of a power station on the neighbouring woodland habitat. Yet several failed to link destruction of woodland to habitat loss or reduction of biodiversity. Some answers explained the effects of the power station after construction rather than during its actual construction.
ii) Relatively few candidates mentioned the gases given off and their effect. Few referred to possibility of acid rain. Answers linking emission to global warming were not accepted as the question asked for localized effects. Candidates' performance was generally poor in this question.
c. Several candidates answered this question correctly. Some suggested that electricity does not cause pollution whilst others did not realise that a monorail system would decrease the number

of cars circulating thus minimising the emissions. Instead they focused on aspects that are not related to biology.
d i) Most candidates answered this question correctly. Others presented responses that lacked detail e.g few mentioned eutrophication.
ii) The majority of candidates answered this question correctly. Unspecific terms such as 'dirt' were not accepted.
e. Although most candidates answered this question correctly, several linked pesticides to eutrophication. Some candidates confused pesticides and fertilizers.
f. i) Candidates were generally unable to define the term ecosystem clearly. Definitions of the term habitat were generally better although several candidates defined it as the place where an animal or a plant lives - when the habitat is in fact the place where an *organism* lives; not necessarily plant or animal! Others incorrectly suggested that it is the place where a species lives.
ii) Candidates generally suggested that birds and mammals are both endotherms. However several used the term 'warm blooded', a term that should have long been abolished from biological terms! It should be stressed that the syllabus only mentions the terms *endotherm* and *homeotherm* (SEC syllabus 2006-2007 p.8 and p.10).
iii) Most candidates answered this question correctly. Others incorrectly suggested that fish and crustaceans or crustaceans and molluscs belong to the same phylum. Others did not mention the three vertebrate groups.
iv) The majority of candidates answered this question correctly.
v) The majority of candidates answered this question correctly.

Question 5
a i) The majority of candidates answered this question correctly.
ii) The majority of candidates gave only one valid reason rather than two. A common misconception is that carbohydrates are a source of heat or provide insulation. Few referred to the role of carbohydrates as energy stores or as constituents of cell walls.
b) Most candidates answered this question correctly. Others did show their reasoning when trying to explain why children suffering from galactosaemia cannot eat ice-cream.
c) Several candidates answered this question correctly. Others did not realise that dairy products are sources of calcium. Some incorrectly suggested that calcium replaces carbohydrates/ galactose in dairy products whilst others stated that calcium aids in the digestion of galactose.
d) Several candidates incorrectly defined an enzyme as 'something which breaks down food'. Many candidates limited their definition of digestion to 'the break down of food'.
e) The majority of candidates answered this question correctly.
f i) Most candidates answered this question correctly. Others limited their definition to 'a person who carries a disease' thus omitting the fact that carriers can pass defective genes to their offspring.
ii) The majority of candidates answered this question correctly.
iii) Many candidates mention haemophilia or colour blindness. Some candidates confused colour blindness with blindness or night blindness. Others incorrectly mentioned sickle-cell anaemia or AIDS.
Practically all candidates did not mention that classic galactosaemia is inherited through the non-sex chromosomes, but only stated that galactosaemia occurs equally in both sexes while sex-linked diseases tend to be found in a particular sex.

g) Many candidates assumed sex-linkage when this was not the case. This is rather disappointing, considering that in the previous question candidates had explained how inheritance of galactosaemia was different from that of sex-linked diseases. Many of those candidates who did not assume sex-linkage used incorrect symbols but arrived at the correct percentage values. Candidates who constructed genetic diagrams often did not represent gametes separately.

Question 6

This question was frequently chosen by candidates. In part 6 a) most failed to score full marks as they did not give all the necessary details required for. Yet some candidates did give correct and detailed answers. Very often candidates defined the terms correctly but then failed to give their *biological importance.* The terms copulation, menstruation, moulting and nitrification were those terms mostly confused or omitted.

a i) The majority of candidates answered this question correctly, although some did not mention the agents that cause sneezing e.g. dust and/or bacteria.

ii) Several candidates answered this question correctly. Others were unable to discuss the biological importance of deamination. In fact responses reflected that they had no idea what it involved. Other stated that deamination is important so that excess amino acids, rather than amino-groups can be converted to urea.

iii) Most candidates stated that copulation is important because it leads to fertilization without mentioning the fact that during copulation sperm is released/deposited into the vagina. Some candidates confused the terms copulation and fertilization.

iv) The majority of candidates answered this question correctly.

v) The majority of candidates answered this question correctly. Some candidates confused shivering with pilo-erection.

vi) Most candidates answered this question correctly. Yet some described the whole uterine and ovarian cycle.

vii) Few candidates were able to suggest the biological importance of moulting.

viii) The majority of candidates answered this question correctly. Some candidates incorrectly defined transpiration as 'the movement of water up a plant.'

ix) Most candidates answered this question correctly. Some confused nitrification with nitrogen fixing.

b i) Candidates frequently answered this question correctly. Others gave incorrect or inadequate examples e.g. "touching a hot object". This is not a reflex action, but removing ones hand from a hot object is a reflex action.

ii) The majority of candidates answered this question correctly. Besides listing the five points in the marking scheme most candidates included good diagrams of the reflex arc. On the other hand, incomplete answers generally suggested that sensory neurons relay messages to the brain/cns but ignored the presence of receptors that detect stimuli.

Question 7

Candidates' performance in this question was generally poor.

a i) Answers were generally poor and not of SEC level standard. Generally candidates failed to design and describe a correct and fair procedure for this setup. Some just limited themselves to describing how to set up the apparatus shown in the diagram provided.

Few candidates mentioned that varying the distance of the lamp from the apparatus changes light intensity. Generally more complicated but less practical options (even though correct) were forwarded e.g. altering lamp wattage or using more than one lamp.
Others suggested the experiment should be performed in the dark and in light but made no reference to altering light intensity.
ii) Practically none of the candidates suggested that the length of the gas column in the capillary tube should be measured. Suggestions included:

- introducing a bubble in the capillary tube and measuring the distance moved by the bubble (implying confusion with potometer experiments);
- measuring the amount of water taken up by the pondweed as it photosynthesizes;
- measuring the volume of oxygen collected in the syringe.

iii) Precautions suggested were often incorrect or unrelated to this particular experiment.
b) Most candidates sketched a straight line graph, showing that as the light intensity increases the rate of photosynthesis increases. Saturation was generally not indicated on the curve, even though some candidates mentioned limiting factors in their explanation. Some candidates reversed the axes of the curve.
c) Several candidates answered this question correctly. Others confused sodium hydrogen carbonate with sodium hydroxide and suggested that it absorbs carbon dioxide. A few incorrectly suggested that sodium hydrogen carbonate is used to absorb oxygen.
d) The majority of candidates said that it is essential to have a thermometer in the water surrounding the pondweed 'to *maintain* a constant temperature since temperature influences the rate of photosynthesis' but did not refer to enzyme activity. Others completely failed to realize that changes in temperature alter the rate of photosynthesis.
e) Several candidates answered this question correctly. Others knew that iodine is used to test for starch but failed to describe the whole procedure that a leaf must undergo for this test and simply stated that iodine drops are put on the leaf.
f) Most candidates mentioned that air spaces help in the diffusion of gases. Very few candidates stated that these air spaces have a role in buoyancy.

2.2: Comments regarding Paper 2B

Question 1

a. i) Several candidates were unable to suggest one characteristic of arthropods.
ii) Most candidates answered this question correctly. Others suggested the presence of wings and/or antennae without specifying the number of pairs (especially for antennae) characteristic of the insect class.
b. Candidates were generally unable to distinguish between nectar and pollen.
c. The majority of candidates answered this question correctly.
d. The majority of candidates answered this question correctly. Many candidates described cross-pollination well. The two main errors observed suggest that "*insect moves from one flower to another on the same plant"* or "*the insect travels to a flower of a different species plant."*
e. The majority of candidates answered this question correctly.
f. i) Several candidates answered this question correctly.
ii) The majority of candidates answered this question correctly.

Question 2

a. i) Candidates rarely used the presence or absence of gametes to distinguish between sexual and asexual reproduction. The main focus was generally the number of parents present.

ii) Although candidates presented various answers only few mentioned the term *variation* as an advantage of sexual reproduction.

iii) Some candidates presented correct diagrams of the mycelium with sporangia. Yet labelling was often omitted or incorrect.

b. i) Most candidates answered this question correctly. Others presented inexact responses such as large, deep roots instead of shallow, spread out roots and thorns instead of leaves reduced to spines. Many candidates referred to thorns as stings!

ii) Most candidates answered this question correctly. Others showed that they did not understand the question.

c. i) Several candidates were unable to define the term *biological control* and often suggested that it was a pesticide.

ii) Candidates who were able to define biological control in part c i), presented fairly good answers here. But the majority of answers were incorrect.

iii) Several candidates answered this question correctly and generally mentioned contol of aphids by means of ladybirds.

Question 3

a. Most candidates correctly named gills as the respiratory surface of fish, but were generally unable to name the respiratory surfaces of insects and humans. Candidates generally mentioned spiracles and lungs rather than tracheoles and alveoli.

b. Most candidates failed in this part of this question. This is rather disappointing considering that this question was rather simple and straightforward. In fact few were able to give four characteristics of a respiratory surface.

c. Several candidates presented poor and incorrect diagrams generally reflecting that they have no idea of the structure of the pulmonary system. Bronchioles and alveoli were generally omitted as only external views of the lungs were drawn. Others presented very good diagrams.

d. i) The majority of candidates gave incorrect answers, showing lack of knowledge of emphysema. Whilst few candidates did mention lack of cilia wafting and the breakdown of the alveoli, only a handful mentioned that this is due to accumulation of mucus.

ii) The majority of candidates gave incorrect answers, showing lack of knowledge of emphysema.

e. Most candidates did not understand this question and omitted it. The few who attempted it had no idea of the inspiratory process and its mechanism. Thus they generally described the pathway of air from the nose to the lungs.

f. Candidates generally presented correct answers.

Question 4

a. i) Answers were generally correct but lacked sufficient detail.

ii) The majority of candidates were unable to give the biological importance of copulation. Indeed most responses indicated an inability to define the process. A relatively high proportion of candidates omitted this question.

iii) Answers were generally correct but lacked sufficient detail.

iv) The majority of candidates were unable to give the biological importance of menstruation. Most responses indicate that they have no idea what menstruation is. A relatively high proportion of candidates omitted this question.
v) Several candidates confused transpiration with sweating (perspiration) or blood circulation. A relatively high proportion of candidates omitted this question.
b. i) Very few candidates answered this question correctly. Responses suggested that candidates were familiar with the concept but in most cases were unable to express their ideas in correct and legible English.
ii) Very few candidates answered this question correctly.
c. Most candidates were able to name the process of absorption, but were generally unable to name the other processes. Several candidates omitted this question.

Question 5

a) The majority of candidates answered this question correctly often suggesting fish-farming and reducing fishing quotas.
b i) Many candidates suggested that the construction of the power station would pollute the air in the vicinity of the woodland. Others limited their answers to just saying that construction of the power station would destroy the woodland, without making any reference to terms such as deforestation, habitat loss or reduction of biodiversity. Candidates were generally unable to include and/or use biological terms in their responses. Many explained the effects of the power station after construction rather than during construction.
ii) Several candidates answered this question correctly. Others just mentioned any two pollutants studied during their SEC biology course without realizing that these are not emitted from power stations.
c) Most candidates answered this question correctly. Yet several candidates suggested advantages that are not related to biological aspects.
d i) Most candidates answered this question correctly. Others presented responses that lacked detail e.g few mentioned eutrophication.
ii) The majority of candidates answered this question correctly. Unspecific terms such as 'dirt' were not accepted.
e) The majority of candidates answered this question correctly.
f i) The majority of candidates were unable to define term *ecosystem*. Many candidates incorrectly defined a habitat as "a place where a species lives" or the "place were an animal lives." One should note that habitat is in fact the place where an *organisms* lives.
ii) Many candidates stated that 'mammals are warm-blooded'. This term should be avoided.
iii) Many candidates mentioned fish and crustaceans or crustaceans and molluscs as belonging to the same phylum. Others did not mention the three vertebrate groups.
iv) Candidates generally suggested that birds and mammals are 'warm blooded', a term that should have long been abolished from biological terms! It should be stressed that syllabus only mentions the terms *endotherm* and *homeotherm* (SEC syllabus 2006-2007 p.8 and p.10).

Question 6

a i) The majority of candidates answered this question correctly.

ii) The majority of candidates gave only one valid reason rather than two. A common misconception is that carbohydrates are a source of heat or provide insulation. Few referred to the role of carbohydrates as energy stores or as constituents of cell walls.

iii) Several candidates answered this question correctly. Others suggested two sources of carbohydrates e.g. pasta, rather than naming two specific carbohydrates.

b) The majority of candidates limited their answer to saying that children suffering from galactosemia lack the enzyme to break down galactose. The candidates' reasoning that lead to this conclusion could thus not be assessed.

c) Several candidates answered this question correctly and showed sound knowledge of rickets and its symptoms. Scurvy was generally mentioned in incorrect responses.

d) Several candidates incorrectly defined an enzyme as 'something which breaks down food'. Many candidates limited their definition of digestion to 'the break down of food'. Others defined digestion as 'the process from ingestion to egestion."

e) The majority of candidates gave protease and carbohydrase for an answer instead of naming specific protease and carbohydrase enzymes.

f i) Many candidates just defined a *carrier* as "a person who carries a disease," and thus failed to state that a carrier may pass defective genes to his/her offspring.

ii) The majority of candidates answered this question correctly.

g) Many candidates assumed sex-linkage when this was not the case. Many of those candidates who did not assume sex-linkage often used two completely different letters to represent the normal and defective genes. Candidates generally gave incorrect and confusing genetic cross diagrams and punnet squares. When punnet squares were correct, most candidates generally failed to interpret the information obtained and gave wrong ratios and percentages.

Question 7

a) Several candidates answered this question correctly. However marks lost were often due to the following common mistakes:

- choice of inadequate scales resulting in very small graphical representations;
- reversal of x- and y-axes;
- axes not labelled;
- title not included*;
- no space left between bars;
- plotting the incorrect set of data;
- sketching the bar chart on ruled paper rather than on graph paper provided.

* It should be noted that titles are not to be written at the very top of the scripts as these are cut off. Candidates must strictly abide to instructions given in the front page of the answer booklet.

b) The majority of candidates answered this question correctly.

c) The majority of candidates answered this question correctly. Incorrect responses generally linked population numbers with availability of medicine rather than use of contraceptives.

d i) Several candidates confused sperm with semen. Saliva was frequently but incorrectly mentioned as a mode of transmission of HIV.

ii) The majority of candidates answered this question incorrectly by stating that newborn babies 'inherit' the HIV virus or acquire it "during intercourse." Few candidates mentioned the placenta as being the route via which the virus travels from the mother to the baby.
e) The majority of candidates answered this question correctly.
f) Most candidates answered this question correctly. Others were unable to mention how bacteria can be beneficial. Candidates could have enhanced their performance in this question by supporting their statements with suitable answers.
g) The majority of candidates did not follow correct biological drawing rules and often did not label their drawings. Several diagrams lacked detail. Some candidates incorrectly labelled the bacterial chromosome as a prokaryotic nucleus. In many cases, bacteria were drawn as a plant cell with a vacuole and nucleus, and in other cases, the various bacterial shapes were drawn, rather than the detailed structure of the bacterium.

Question 8
Candidates' performance in this question was generally poor.
a i) The majority of candidates just described the setting up of the apparatus as shown in the diagram provided but were unable to design an adequate procedure that included the set-up provided.
Many candidates said that the experiment should be performed in the dark and in light but made no reference to altering light intensity. Very few candidates suggested that light intensity by changing the distance of the lamp from the *Elodea*.
ii) Many candidates said that readings of rate of photosynthesis should be taken, without indicating how this can be done.
iii) Most candidates mentioned a wide variety of incorrect and unrelated precautions.
b) Most candidates drew a straight line graph, showing that as the light intensity increases the rate of photosynthesis increases, without showing/making any reference to saturation. The concept of limiting factors was rarely mentioned. Some candidates inverted the axes.
c i) Several candidates answered this question correctly.
ii) Few candidates made reference to the fact that photosynthesis is an enzyme-controlled reaction. Others presented incorrect answers suggesting that "water temperature must be kept constant was to see if the plant gives off heat!"
d i) The majority of candidates answered this question correctly. Few candidates confused chloroplasts with chlorophyll.
ii) Several candidates answered this question correctly but others were unable to identify the leaf tissue that contains chloroplasts. Some candidates mentioned particular types of cells rather than the actual tissue.
iii) The majority of candidates answered this question correctly. In contrast with paper 2A candidates, some of the paper 2B candidates did state that air spaces make the leaves buoyant.

Part 3: Comments on Coursework

1 The moderating team is highly satisfied by the varied practical work presented which includes several topics as required by the SEC syllabus. It is clearly evident that practical work is being performed throughout the three years that the students study biology in secondary schools.

2 The team is also satisfied that through practical work students are developing the skills identified in the syllabus namely: manipulative skills, the ability to follow instructions carefully, observation, identification, recording and interpretation, presentation of experimental results with calculations, interpretation of data and experimental design.

3 Although SEC Biology clearly stipulates the categories of practicals that should be presented, these are often not being included. Although generally this is occurring at the student level, sometimes this was observed at the school level. Students should be made aware that they are **not free** to present any 15 practicals, but they should follow the guidelines included in the syllabus to ensure that all sections are represented.

4 The moderating team suggests that practical write-ups should be presented in ring-files rather than on traditional laboratory report books. Use of dividers would help students to ensure that all categories are presented, and ensure that problem-solving investigations are included as well. Other additional practicals can then be presented as a section entitled "Other practicals" or "Appendix".

5 The laboratory reports presented generally followed the rules stipulated when presenting a scientific report. Students were able to observe, identify and record results appropriately and manipulate data well. Discussions and conclusions were often extensive and many referred to theory to validate their results. Yet some schools need to work more on this.

6 Problem solving investigations seem to be the greatest challenge to implement. Once again the moderating team cannot ignore that problem-solving investigation reports are not organized into the three sections identified in the syllabus. Instead they were presented in the usual practical write-up format.

7 The majority of write-ups of problem-solving investigations unfortunately reflected that most students were not really solving a problem but they set out to prove known facts. It is suggested that these investigations are performed before all relevant theoretical background is covered during biology lessons. Thus students would really be predicting the expected outcomes of their investigations. Students are also weak in self-criticism when analyzing their practical work component.

8 The moderating team realizes that the skills involved in problem-solving investigations take time to develop. Thus Form 3 students can undertake these investigations as a whole class or in groups. However Form 5 students should be given the opportunity to perform these exercises on an individual basis. Furthermore, during theoretical sessions, tutors should strive to encourage the development of problem solving skills using adequate questioning techniques.

9 Field-work experience was practically observed in all schools. Tutors are not only planning fieldwork well but also exploring new ways and sites where to implement it. In this session an excellently planned fieldwork on the seashore was observed. This is highly recommended.

10 The various schools showed diversity in the visits to sites of biological interest that were visited. These included visits to Argotti Gardens, Wied Għollieqa, Għammieri Farm, Plant nurseries and Reverse Osmosis plants. The moderating team stresses the importance of these visits that provide students with first-hand experiences that make the subject more interesting. Tutors should exploit these visits to the full and ensure that the biological aspect of these visits is clearly grasped by the students.

Chairperson
Board of Examiners
July 2007