edexcel INTERNATIONAL

Mark Scheme with Examiners' Report

GCE O Level Biology (7040)

January 2006

delivered locally, recognised globally

Edexcel is one of the leading examining and awarding bodies in the UK and throughout the world. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers.

Through a network of UK and overseas offices, Edexcel International centres receive the support they need to help them deliver their education and training programmes to learners.

For further information please call our International Customer Services Unit:

Tel +44 (0) 190 884 7750

Fax +44 (0) 207 190 5700

www.edexcel-international.org

January 2006

BIOLOGY 7040, MARK SCHEME

Symbols used in mark points

; indicates separate mark points
/ indicates alternatives
eq means allow any correct equivalent

Paper 1

1. (a) more/lots/all offspring can feed (at once) eq / reduce competition / enable feeding when one teat empty; **(1)**

(b) lose more heat/energy / need more energy;
fat has high energy content; **max**
fat stored / insulator / keep warm; A ref. to blubber **(2)**

(c) Biuret / NaOH + $CuSO_4$;
purple;
(2)

(d) very young need protein;
for growth;
older need/use fat; **max**
for energy / keep warm; **(2)**

(e) imbalance of hormones / prolactin; **(1)**

(f) stop metabolising body tissues;
prevents mother dying / allows mother to survive; **(2)**

(g) no need for clean water / sterilisation of equipment / prevent infection;
antibodies / provides immunity to disease;
correct composition / all of CHO, fats, minerals and vitamins;
cheaper / easier / more convenient / correct temperature; **(3)**

Total 13 marks

2. (a) 590 / (0.90x 20) / 18;
608;; **(2)**

(b) (i) 4; **(1)**

(ii) larger surface area to volume ratio / more active / respire more; **(1)**

(iii) maintain (optimum) body temp / best for enzymes / reactions / metabolism; **ignore keep warm**
respiration;
uses glucose / carbohydrate / sugar / fat; **(3)**

(c) (i) 3.6 / 3.64 / 3.636 ; **NOT 3.63** **(1)**

(ii) rabbit ;
same gain in mass in fewer days / more gain in same time / eq; **(2)**

(iii) more <u>protein</u> in diet;
house indoors / prevent movement; **max**
to prevent heat loss; **(2)**

Total 12 marks

3. (a) (i) carry oxygen;
haemoglobin ;
from lungs to cells; **(3)**

(ii) liquid / fluid / dissolves / in solution;
carries / transports;
carbon dioxide / glucose / proteins / salts / urea / cells / heat ; **(3)**

(i) clot blood;
reference to thrombokinase / prothrombin / thrombin / fibrinogen / fibrin;
stop blood loss; **max**
prevent entry of pathogens / eq; **(2)**

(b) lymphocytes eq;
antibodies;
antitoxins;
phagocytes / phagocytosis / eq; **max**
engulf; **(4)**

(c) (i) suitable example; suitable disease;
suitable example; suitable disease; **(4)**

(iii) (e.g. malaria)
spread via insect vectors;
use insecticide to kill insects;
take anti malarial drugs to kill plasmodium; **max**
use insect repellent to avoid being bitten; **(2)**

(d) C exercise + no exercise;
O same age / same level of fitness / same gender / same person;
R repeat exercise / repeat with more than one person;
M measure pulse / heart beat;
method of measuring pulse;
for stated time period; **max**
S same period of exercise / same time of day ; **(7)**
RES faster rate after exercise;

Total 25 marks

4 (a) (i) (number of) organisms of the same species living in the same area; **(1)**

(ii) all the different species / organisms living in an area or habitat; **(1)**

(iii) the place an organism lives /eq; **(1)**

(b) (i) more biomass (in spring) / more plants / more plant growth;
more photosynthesis;
more (hours of) light;
higher temperature; **max**
ALLOW converse **(4)**

(b) (ii) more herbivores / primary consumers / animals;
more food;
more carnivores / secondary consumers;
ref to migration; **max**
ALLOW converse **(3)**

(c) radicle;
plumule;
uptake of water;
testa splits;
enzymes / named activated;
hydrolysis / digestion;
starch to maltose;
amylase;
fats / lipid to fatty acids & glycerol;
lipase;
to provide energy; **max**
for respiration; **(8)**

(d) C + and - acid / range of pH;
O same plants / seeds / genotypes / strain / number of seeds;
R average / replication;
M measure yield;
suitable description e.g. mass / number of plants ;
S same soil condition / content / watering /
same temperature / sunlight / ;; **max**
stated time 2 weeks to 6 months; **(7)**

Total 25 marks

5. (a) Glomerulus / knot of capillaries;
substances out;
Renal / Bowman's capsule;
Ultrafiltration;
Water / urea / glucose / amino acids/ salts /
small molecules /eq;
Not blood cells / proteins / large molecules;

Reabsorption / eq;
Glucose / water / amino acids / eq;
In proximal / distal convoluted tubule / eq ;
Active transport / diffusion / osmosis;
if used correctly
Collecting duct;
ADH; **max**
Urea/ salts / some water excreted; **(8)**

(b) (i) water enters cell ;
by osmosis;
(contractile) vacuole;
water out; **max**
requires energy / active / uses ATP; **(3)**

(ii) salt water at about same concentration / more concentrated than cell contents;
no water enters / leaves / no movement of water / no osmosis; **(2)**

(c) (i) water content of blood increases;
more urine / water released; **max**
less concentrated urine / (more) dilute / less salt; **(2)**

(ii) (more) sweating;
less urine / less water; **max**
(more) concentrated urine / less dilute; **(2)**

(iii) (more) concentrated urine / less dilute;
more urea released; **max**
amino acids / proteins broken down / deamination ; **(2)**

(c) C soil from two locations;
O same mass / volume of soil;
R repeat number of samples;
M weigh soil;
heat;
reweigh;
S heat for same time; **max**
same temp. / eq; **(6)**

Total 25 marks

6. (a) gametes;
fertilization / fusion;
genetic variation;
slower process;
max (3)

(b) stamen;
anther;
filament;
stigma;
style;
ovary;
carpel;
ovule;
petal / corolla;
sepal / calyx;
nectary;
max (6)

(c) (i) self pollen transferred (from anther to stigma) in same flower / plant;
cross pollen transferred (from anther to stigma) of different flower / plant;
max (1)

(ii) genetic variation;
less likely to occur;
(2)

(iii) pollen grain germinates;
pollen tube grows;
down style;
male nucleus/ nuclei / gametes ;
enter ovule;
via micropyle;
fuse with egg cell / fertilises;
zygote formed;
endosperm formed;
ovule becomes seed;
ovary becomes fruit;
integument becomes testa;
max (7)

(d) C observe number of visits by insect to flower / use different number of insects;
O one species/ named species of flower / same flower;
R repeat for several flowers/ several times;
M collect seeds produced / eq;
count seeds;
S same time of day / same weather / same location in same time period Same insects;;
max (6)

Total 25 marks

7. (a) churns / mixes;
HCl / acid;
kills microorganisms / eq;
optimum / suitable pH;
protease/ pepsin / renin;
digested; **max**
protein to amino acids / (poly)peptides / caseinogen to casein; **(4)**

(b) villi / microvilli;
large SA / long;
diffusion;
contains capillaries / blood vessels; **max**
lacteals; **(4)**

(c) (i) saprophyte;
external digestion;
enzymes/ named enzymes; **max**
absorption / eq; **(3)**

(ii) C 2 temperatures ;
O same mass / area /amount of mould / number of spores starting culture;
R repeat / two pieces of bread for each temperature ;
M measure mass /area / amount of mould; same time;
S same moisture; **max**
same age of /type of bread; **(6)**

(d) (waxy) cuticle;
(upper) epidermis;
palisade (mesophyll);
chloroplasts;
spongy (mesophyll);
lower epidermis;
guard cells;
stomata;
xylem; **max**
phloem; **(8)**

Total 25 marks

Paper 2

1. (a) crush /grind grass;
Benedicts;
heat / eq; **NOT** boil with ethanol
red eq; **(3 max)**

(b) wet ;
bacteria/ fungi / decomposers/ microorganisms;
respiration; **(3 max)**
produces heat;

Total 6 marks

2. (a)

Process	**Enzyme**
The digestion of fat	Lipase;
The digestion of maltose	Maltase;
Cutting DNA at specific sites	Restriction / endonuclease;
Joining pieces of DNA together	Ligase;

(4)

(b) (i) line continues up;
then down; **(2)**

(ii) Molecules move slowly / do not move;
(less) kinetic energy;
(less) enzyme activity / enzymes do not function / inactive; **(2 max)**

Total 8 marks

3. (a) P nucleus;
Q cytoplasm; **(2)**

(b) (i) active transport / uptake;
low to high concentration;
energy / ATP; **(2 max)**

(ii) osmosis;
high to low concentration of water/ dil to conc solution / eq;
selectively permeable membrane; **(2 max)**

(c) water not absorbed / water enters faeces /
high salt conc.; **(1 max)**

(d) (i) 250; **(1)**

(ii) C; **(1)**

(iii) mouth;
water absorbed / taken in;
cures / makes better ; **(2 max)**

Total 11 marks

4. (a)

Step	
Eggs and sperm mixed	4;
Eggs collected from woman and put into special solution in Petri dish	2;
Eggs checked to make sure they have been fertilised	
Woman given hormone to cause many eggs to develop in her ovaries	1;
Sample of sperm collected	
The embryos are put into the mother's womb	6;

(4)

(b) (i) FSH; **(1)**
(ii) glucose / oxygen; **(1)**
(iii) diploid number of chromosomes / 46 / double / twice; **(1)**
(iv) Uterus/ womb; **(1)**

(c) Testes / testicles / seminiferous tubules; **(1)**

Total 9 marks

5. (a) (i) Size more than 50% of both axes;
Key / lines labelled;
Axis labelled and right way round;
Points; ; **(5)**
(ii) Maize; **(1)**
(iii) 14 / read off graph; **(1)**

(b) (i) increases;
then levels off / increase becomes less; **(2)**
(ii) 10 to 30: enables more chloroplasts to photosynthesize / light is limiting factor;
40 to 60: other factors / CO_2 / temp. limit photosynthesis; **(2)**

(c) less photosynthesis / less growth (at low light intensity); **(1)**
or converse

Total 12 marks

6. (a) (i) number; **(1)**

(ii) leaves → invertebrates → small birds → sparrow hawk / eq;
correct arrows; **(2)**

(b) if numbers of one organism drops can feed on another;
ensures balanced diet / variety of food types / different nutrients;
reduces competition for one food source / easier to find food; **(2 max)**

(c) builds up / passed along food chain;
kills organisms;
less food available;
Sparrow hawk migrates / eq; **(3 max)**

(d) (i) use of one organism;
to control another; **(2)**

(ii) e.g. ladybird to control aphids; **(1)**

(iii) slow to act;
not all pest destroyed;
control organism may become a pest itself / eq; **(3)**

ignore ref to cost

Total 14 marks

7. (a) A trachea /windpipe;
B bronchus; **(2)**

(b) (C) intercostals muscles;
contract;
moves rib cage upwards / outwards;
(D) diaphragm;
contracts;
moves downwards / flattens;
volume increase; (not lung increases)
pressure decreases; **(5 max)**

Total 7 marks

8. (a) fur;
mammary glands / feed young on milk / produce milk;
(external) ears; **(3)**

(b) (i) damage to buildings;
consume/ damage crops/ food stores;
spread disease; **(2 max)**

(ii) use of poison;
use of traps;
secure food stores/ buildings;
biological control; **(1 max)**

Total 6 marks

9. (a) evaporation;
transpiration; **(2)**

(b) (i) fertilisers; **(1)**

(ii) eutrophication;
growth of plants / algal bloom;
block out light;
no / less photosyntheisis;
under water plants algae die;
bacteria / microorganisms;
decompose /decay /rot;
oxygen depletion;
fish / organisms die; **(4 max)**

Total 7 marks

10. (a) (i) smooth;
wrinkled; **(2)**

(ii) R or r; r;
Rr / heterozygous rr / homozygous recessive;
Smooth wrinkled; **allow TE** **(4)**

(b) Tall / T is dominant;
plants are Tt / heterozygous; **(2)**

(c) 1:2:1; **no TE** **(1)**
3:1; **no TE** **(1)**

Total 10 marks

11. (a) (i) xylem; **(1)**

(ii) salts / minerals / named mineral; **(1)**

(b) (i) phloem; **(1)**

(ii) amino acids / plant growth substances / auxins; **(1)**

(c)

Change	**Volume of water transported**	**Mass products of photosynthesis transported**
Increase in temperature	+;	(+)
Increase in carbon dioxide concentration	0;	+;
Increase in humidity	-;	(0)
Increase in light intensity	+;	+;

(6)

Total 10 marks

PAPER TOTAL 100 MARKS

BIOLOGY 7040, CHIEF EXAMINER'S REPORT

General Comments

The examiners were impressed by the knowledge and understanding shown by the majority of candidates taking these papers. The candidates showed that they could not only remember and describe the biological concepts they had been taught but could also apply these concepts to other, unfamiliar, areas of biology. There was little evidence of candidates running out of time on either Paper 1 or Paper 2.

Paper 1

Section A

Question 1

This question required students to read a passage on 'lactation' and answer items based on the passage and their own knowledge of biology.

Part(a) asked the candidates to suggest why most mammals have twice as many teats as their average litter size. We expected the answers to focus on all the offspring having access to a teat at once. This was stated in many different ways and these were all credited. In part (b), responses needed to include the observations that animals living in a cold climate lose more heat, that fat has a high energy content and that fat can be stored as an insulator under the skin. Only the last of these points was frequently mentioned. Part (c) required candidates to describe how to test a sample of milk for protein. While most were able to describe the Biuret test and its results accurately, some candidates describe adding Biuret to protein and observing the colour change, rather than adding Biuret to the milk sample. For part (d), many candidates were able to note that the younger kangaroo would require more protein for growth and the older sibling would need more fat for energy or to keep warm. Most candidates found the reference to a hormone imbalance in the passage as an explanation of lactation in men in answer to part (e). For part (f), many correctly referred to the passage describing the mother metabolising their own body tissues to earn credit, and the better candidates also explained that this would prevent the mother dying. The last part, (g), asked the candidates to give three reasons why breast milk is more suitable than powdered milk. Suitable answers included provision of immunity, ideal composition, no need for sterilisation of bottles and that the breast milk is more convenient.

Question 2

This required candidates to compare meat production in cattle and rabbits.

Part (a) required a calculation of the mass of the cow after a period of 20 days. Only the best candidates were able to gain full credit for the correct answer; many others gained some credit for their working (multiplying the gain per day by 20 and adding this to the cow's original mass). In part (b), candidates needed to suggest a reason why the heat loss per day was greater for the rabbits than for the cow. Many suggestions referred to surface area and volume but we required a correct reference to the rabbits having a larger surface area to volume ratio than the cow: some candidates described a rabbit as having a larger surface area than a cow. Candidates were also required to give a reason why the heat loss needs to be replaced and explain how this could be achieved. The better candidates were able to state the importance of maintaining a constant body temperature for enzyme reactions, and then to explain how the heat energy is replaced by respiration of glucose. In part (c), most candidates could calculate the gain in body mass and correctly identify the rabbit as being more efficient. Fewer candidates were able to suggest a diet high in protein or indoor housing as a way of improving meat production.

Section B

Candidates are required to choose 3 out of 5 questions to answer in Section B. Only a very few candidates failed to follow this rubric and answered more than 3 questions. Candidates who do this inevitably penalise themselves by not spending enough time on each question so score poorly.

Question 3

This was the most popular choice, being answered by 80% of candidates. Part (a) required candidates to describe how components of blood carried out their functions. Most gained credit for describing how red cells transport oxygen combined with haemoglobin and the best responses also included from the lungs to the body cells. To gain credit, plasma was described as the liquid part of the blood used to transport for example glucose, minerals, and amino acids in solution. The role of platelets in blood clotting and prevention of further blood loss and infection was well remembered by most. In part (b), many responses scored well and candidates earned credit by describing how lymphocytes secrete antibodies and how phagocytes engulf bacteria to protect the body from infection. In part (c), different candidates named different microorganisms and then went on to describe how they were spread and how this could be controlled. Popular examples included malaria and HIV and good descriptions of control methods often followed. Part (d) required the candidates to design an experiment to determine the effect of exercise on heart rate. The answers that used prompts such as CORMS (see previous reports) to remind them of the design requirements scored well. The best candidates scored full marks by describing how they could measure heart rate using radial pulse taken at the wrist for example.

Question 4

This was the least popular question being chosen by only 42% of candidates. This question seemed to be chosen by the weakest candidates and the results, as is often the case for ecology questions, were lower than the other questions they answered. In part (a), responses were often too vague and did not gain credit for population or community: habitat was better described. In part (b), candidates were asked to suggest how the biomass of plants might change between cold winter and warm spring. The best answers referred to the longer days with more hours of sunshine enabling more photosynthesis and of higher temperatures stimulating more plant growth during the spring. The candidates were also asked to describe the effects on animal numbers during the same time. Better answers included the increased availability of food for herbivores, then the increased availability of food for carnivores; other candidates mentioned migration, which was also credited. Some responses mentioned hibernation but since this does not affect numbers it was not credited. Part (c) was straightforward for those candidates that had revised and prepared this topic. Part (d), as the design item, was carried out well by those candidates that had remembered a suitable prompt such as CORMS.

Question 5

This was also unpopular with 43% of candidates choosing this question. Part (a) required candidates to describe the structure of the human nephron and explain how it carries out its role in excretion and osmoregulation. The candidates who had revised this found this straightforward and earned full credit for descriptions of the Bowman's capsule, glomerulus, ultrafiltration, selective reabsorption; the roles of the proximal and distal convoluted tubules, collecting duct; and the substances exchanged and excreted and the role of ADH. Some candidates chose this question unwisely as they were unable to describe this. In part (b)(i), full credit was given to answers that described the role of the contractile vacuole in expelling water from *Amoeba*.

An understanding of the absorption of water by osmosis from its surroundings down a water potential gradient also enabled the best candidates to answer part (b)(ii). Most candidates were able to score well in part (c) by describing the changes in the urine volume and concentration that occur after drinking water, being exposed to a higher temperature and following a protein rich meal. The weaker candidates described the colour of the urine rather than its concentration, volume or water content. The experiment design component in (d) produced some accurate descriptions with candidates using the prompt CORMS to describe a suitable experiment.

Question 6

This was the second most popular, being chosen by 70% of candidates. In part (a), many candidates wrongly gave number of parents as a difference between sexual and asexual reproduction and then described self-pollination and drew a flower with male and female structures. The correct ways expected by the examiners were gamete production, fertilisation and genetic variation. In part (b), all but the least well-prepared candidates scored well. The same applied to part (c), which enabled the candidates that had revised this topic to earn full credit. The experiment design item in part (d) produced some excellent accounts, with those candidates using CORMS as a prompt often picking up highest marks. Candidates suggested a variety of interesting ways to alter the number of insects visiting a flower.

Question 7

This was also a popular choice, being answered by 65% of candidates. In part (a), many candidates scored well by correctly identifying churning of contents, secretion of acid to kill microorganisms and correct an optimum pH, and release of protease to digest proteins into peptides as the functions in the stomach. The structure of the small intestine was often well described in part (b), but not always linked to the processes of diffusion and absorption that it carries out. In part (c)(i), most candidates were able to describe or name external digestion and describe the release of enzymes onto the bread and the absorption of the products. Part (c)(ii) was the design question and candidates using the CORMS prompt usually scored well. The examiners were encouraged by the excellent accounts of how fungal growth could be measured, such as measuring the area that the fungus had spread over in a 48 hour period. Part (d) produced some very good and some very weak responses. The best candidates drew carefully labelled cross-sections of a leaf showing cuticle, upper epidermis, palisade and spongy mesophyll, air spaces, lower epidermis, guard cells, stomata, xylem and phloem and chloroplasts.

Paper 2

Question 1
Those candidates able to recall the test for glucose scored highly in part (a) of this opening question. However, many failed to provide accurate details of the test, often failing to note that heating is required and that the final colour expected is brick-red. Many wrote about the iodine test for starch. Part (b) proved to be surprisingly challenging to most. Answers that stated that the wet grass would show the greatest increase in temperature as a result of heat production from the respiration of decomposing microorganisms were anticipated. However, many opted for dry grass, and gave reasons linked to the presence of water cooling the wet grass in the same way that sweat cools the human body.

Question 2
Lipase and maltase were recalled by most candidates. However, only the better candidates recalled that restriction endonuclease and ligase are enzymes involved in genetic modification. In part (b) (i), marks were available for showing a continued increase to near 42^0C and then a decrease. Most gained a mark for showing an increase but many then drew a constant line, failing to appreciate that high temperature would inhibit the amount of lactic acid produced. Knowledge about low kinetic energy resulting in few collisions between enzyme molecules and their substrate was only demonstrated by the better candidates.

Question 3
As might be expected, the recall of the nucleus and cytoplasm as the names of the parts labelled P and Q respectively was successfully achieved by most candidates. Part (b) tested knowledge about active transport and osmosis. Only a small number of the better candidates appreciated that the salt movement involves active transport moving molecules from a low concentration to a higher concentration with the expenditure of energy. Osmosis is a process that is understood by more candidates, who appreciate that water is moved passively from a high concentration of water to a low concentration of water through a selectively permeable membrane. In part (c), marks were lost by those candidates who merely repeated the wording in the stem of the question. Answers that discussed the fact that water would not be absorbed, or that water would be taken out of the cells as a result of the high salt concentration in the faeces were rewarded. In part (d), 250 cm^3 was the correct answer for part (i), and in part (ii), treatment C was the most successful, a fact that even the better candidates struggled to appreciate. In part (iii), it was hoped that candidates would be able to realise that oral equates to the mouth, that rehydration equates to water getting into cells and that therapy equates to being cured or getting better. A straightforward question that proved a challenge to many.

Question 4
The examiners were impressed by the large number of candidates who were able to number the order of steps correctly. However, only the better candidates recalled FSH as the hormone responsible for the development of eggs in the ovary in part (b) (i). In part (b) (ii), a number of candidates failed to read the question carefully to ensure that their answer named a substance needed for respiration. As such, water or salts as a response were not rewarded, the marks being awarded for glucose or oxygen. A surprising number of candidates were unable to state that a fertilised egg is diploid, or something equivalent, such as that it contains 46 chromosomes. Most appreciated that the uterus is the site of implantation and that sperm are made in the testes.

Question 5

This was a challenging graph to plot, but candidates gained considerable success. One mark was available for ensuring that the scales chosen used at least half the grid. One mark was available for using a key or some other acceptable method to distinguish between the two lines drawn. One mark was also available for labelling each axis correctly and ensuring that the independent and dependent variable were on the correct axes. Two marks were available for accurate plotting of points, with one mark deducted for a wrong plot up to a maximum of two. Maize was recognised by the vast majority as the plant which reaches the highest rate of photosynthesis. The answer to part (a) (iii) was read from the graph produced by each student. Descriptions of the shape of graphs could be improved. Candidates fail to describe accurately. In this case the description needed to make it clear that the rate increased and then levelled off at a constant high rate. Candidates who wrote "the rate was fast and then steady" gained no credit because they left too much to be interpreted by the examiner. Part (b) (ii) was the most difficult part of the paper with very few candidates gaining credit. Most tended to describe the results, presumably because they fail to appreciate that the word "explain" requires answers that provide biological reasons for the pattern observed. Part (c) was well answered.

Question 6

Only the better candidates appreciated that the diagram depicted a pyramid of numbers, but most were able to construct an accurate food chain. Credit was lost if arrows were incorrect, or if a food web had been drawn. Most were able to appreciate that feeding on a variety of herbivores enabled survival, should one type of herbivore drop in number. However, a supporting point, such as the provision of a balanced diet, or the reduction in competition, was seldom seen. There were some pleasing answers to part (c), with many candidates commenting on the bioaccumulation of the poison and its lethal effect reducing the food available. Many were able to define the term biological control accurately and to provide an acceptable example. Stating three disadvantages posed more of a challenge. Some candidates failed to read the question carefully and listed advantages.

Question 7

Only the weakest candidates failed to recall the names of parts A and B, and they also struggled with part (b). However, most candidates scored highly in this question with some excellent descriptions of how the diaphragm and external intercostal muscles contract to alter the volume of the thorax and the pressure inside the lungs.

Question 8

Many candidates were able to identify hair, external ears and suckling milk from mammary glands as the three features seen in the picture. Weaker candidates named features that cannot be seen in the picture and failed to gain credit. Most were able to give at least one way in which rats cause damage on a farm, with damage to crops as the most common response. Spread of disease and damage to buildings were often mentioned. Astute candidates named biological control as a method for reducing the damage caused by rats; but using traps or poison, and the securing of food stores were other acceptable responses often seen.

Question 9

Most candidates were able to recall evaporation and transpiration as the relevant processes in part (a). In part (b)(i), fertiliser was the anticipated answer which was given by about half of the candidates. Answers to (b)(ii) left much to be desired. The process of eutrophication is poorly understood by many candidates and those that have an understanding seem to struggle to write their ideas down in a clear, logical and erudite fashion.

Question 10
This genetics question was well answered by many candidates. Most appreciated that the genotype Rr would give a smooth phenotype and that rr would give a wrinkled phenotype. The genetic diagram was also well constructed by most. The conclusion that the allele T is dominant and that the genetic make-up of the tall plants is heterozygous or Tt posed more of a challenge. The correct genotype ratio of 1:2:1 and the correct phenotype ratio of 3:1 was seen on a large number of scripts in part (b)(ii).

Question 11
The fact that the xylem transports mineral salts is known by many candidates. So too is the fact that the phloem transports the products of photosynthesis. Less well known is the fact that the phloem also transports amino acids. Part (c) challenged candidates and produced a range of marks from zero to six. As such, it served as a useful discriminating question on which to end the paper.

BIOLOGY 7040, GRADE BOUNDARIES

Grade	A	B	C	D	E
Lowest mark for award of grade	133	112	92	82	57

Note: Grade boundaries may vary from year to year and from subject to subject, depending on the demands of the question paper.