

Mark Scheme with Examiners' Report GCE O Level Human Biology (7042)

January 2006

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January 2006

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HUMAN BIOLOGY 7042, MARK SCHEME

Paper 1

1. (a) lungs; (1)
- (b) hepatic vein;
vena cava; (ignore ref. to inferior/superior)
pulmonary artery;
pulmonary vein;
aorta;
renal artery; (6)
- (c) (i) ultrafiltration/pressure filtration; (1)
- (ii) creatinine;
uric acid;
hormones/named hormone;
alcohol/toxins/poisons;
bilirubin;
water;
amino acids;
minerals/salts; NOT ammonium salts
salt;
ions; max
vitamins; (2)
NOT glucose

(Total 10 marks)

2. (a) A nucleus;
B dendrites;
C myelin/fatty sheath/Schwann cell/insulating sheath;
D axon/node of Ranvier; (4)
- (b) motor; (1)
- cell body at one end/not in middle;
long axon; max
short dendrites; (1)
- (c) arrow drawn away from cell body; (1)
- (d) (impulse reaches) axon terminal/synapse;
increases permeability;
of pre-synaptic membrane;
to calcium ions;
these cause vesicles;
neurotransmitter substance/acetylcholine;
to fuse with membrane;
transmitter substance released;
diffuses across gap/cleft; max
triggers impulse in post synaptic membrane/next neurone; (4)

(Total 11 marks)

3. (a) A;
C;
C;
D; (4)
- (b) mitochondria;
golgi body;
nucleolus;
ribosomes;
rough endoplasmic reticulum; max
smooth endoplasmic reticulum; NOT vesicles/vacuoles (2)
- (c) three cells of similar shape to those in diagram;
no/flattened cilia; (2)
- (d) (i) oxygen into blood;
carbon dioxide out of blood;
diffusion (linked to gases)/gaseous exchange/exchange oxygen and carbon dioxide; max
(2)
- (ii) reduction/breakdown of fibres;
can't deflate/recoil as much; max
alveoli appear larger/stretched; NOT loss of elasticity (2)
- (iii) blood capillaries; (1)

(Total 13 marks)

4. (a) canine;
incisor;
enamel;
dentine;
nerves/nervous tissue/nerve endings/neurones/receptors; (5)
- (b) removes bacteria/plaque;
acid not produced/removed; max
enamel not dissolved/broken down; (2)

(Total 7 marks)

5. (a) (i) chemical;
secreted into/transported by, blood;
produced by endocrine gland;
long lasting/acts slowly;
causes changes in body; max
(2)
- (ii) pancreas/islets of Langerhans/beta cells; (1)
liver; (1)
- (b) (i) five sufferers in fourth generation/ $\frac{15}{5}$; (2)
ratio 1 to 2/ $\frac{1}{3}$ /33%; **NOT** 3 to 1
- (ii) circle around third generation non suffering couple that
produce sufferer child;
two non sufferers produce sufferer child;
if it were a dominant allele one/both parents would suffer;
if heterozygous;
(therefore must be) recessive;
only appears in homozygotes;
few sufferers; max
(4)
if it were a dominant allele there would be more sufferers;
- (iii) mutation; (1)

(Total 11 marks)

6. (a) (i) light rays bent at cornea;
rays pass through pupil (don't go through iris);
rays bent at lens; max
(3)
rays cross in vitreous humour;
- (ii) lens thinner/less convex; (1)
- (b) (i) large pupil; (more than half the size of the iris)
small iris; (2)
- (ii) pupil becomes small;
rapidly; max
(2)
iris larger/circular muscles of iris contract;
- (c) retina only stimulated once;
one image;
but need two images to judge relative positions/each eye
forms separate image/forms 3D image;
brain combines interprets image; max
(3)
relative positions give judgement of distance;

(Total 11 marks)

7. (a) A sperm duct;
 B urethra;
 C penis;
 D testes/testicle;
 E scrotum/scrotal sac; (5)
- (b) urine; (1)
- (c) secrete fluid;
 added to sperm;
 activates sperm/makes them swim;
 transport of sperm; max
 nutrients for sperm; (2)
- (d) line to testis; (1)
- (e) sperm diagram
 head plus nucleus which occupies most of head plus tail; (1)
- labels
 head;
 nucleus;
 mitochondria;
 acrosome/enzyme producing region; max
 tail; (2)

(Total 12 marks)

8. (a) (i) lipase; (1)
- (ii) pancreas/pancreatic/duodenum; (1)
- (iii) glycerol;
 fatty acids; (2)
- (b) (i) scale;
 most of graph paper used;
 points plotted correctly;
 line drawn; (4)
- (ii) correct reading from graph; (1)
- (c) (i) emulsify fats/optimum pH/neutralise acid; (1)
- (ii) same shape as plot;
 above plot; (2)

(Total 12 marks)

9. (a) (i) A = 6 mm (+/- 1);
B = 21 mm (+/-1); (2)

(ii) disc E;
largest clear area around disc;
no bacteria growing in this area/free of bacteria/greater
number of bacteria killed; max
antibiotic effective at preventing growth/disease; (2)

(b) vaccination;
isolate patients;
improve housing;
test cattle for disease;
use handkerchief;
health education; max
no spitting; (2)

(Total 6 marks)

10. (a) (i) one large/small pair labelled; (1)

(ii) 4; (1)

(b) 46 (1)

(c) <i>mitosis</i>	<i>meiosis</i>
diploid number/2n;	haploid number/n;
occurs/becomes somatic/body cells;	become gametes/
	occurs in sex organs;
cells genetically identical;	not genetically identical; max
two cells produced;	four cells produced; (4)

(Total 7 marks)

PAPER TOTAL 100 MARKS

Paper 2

Section A

Answer any THREE questions

1. (a) polymer / chain compound;
large molecule;
contains nitrogen / 'N' in molecular structure;
made up of amino acids; max
joined by peptide bonds; (3)
any three - 1 mark each
- (b) mix cheese with water;
grind together;
use Biuret solution / perform Biuret test / use sodium hydroxide;
+ copper sulphate;
change from blue;
to mauve / purple / lilac;
indicates positive result / protein present; max
(accept any suitable test and result) (4)
any four - 1 mark each
- (c) chewed in mouth / broken by teeth;
passes to stomach;
acted on by pepsin;
protein to polypeptide/peptides;
acid conditions / presence of HCl;
activates pepsin;
passes to duodenum;
acted on by trypsin / pancreatic protease;
polypeptides to peptides;
into ileum;
carboxypeptidases / peptidases / erepsin; max
(convert) peptides / polypeptides to amino acids; (8)
If no named enzyme, allow 'protease' once
any eight - 1 mark each
- (d) Needed for enzymes / haemoglobin;
kwashiorkor;
marasmus;
underweight / poor growth;
wounds don't heal;
oedema / swelling / orange hair;
(early) death;
weakened immune system; max
so more susceptible to disease; (5)
any five - 1 mark each

Total 20 marks

2. (a) (i) *quality of diagram*
 roughly circular;
 three layers;
 thick muscle layer;
 correct diameter of lumen relative to walls;
any three - 1 mark each max
(3)
- labels*
 lumen;
 endothelium / lining;
 (tunica media) / muscle / elastic layer;
 (tunica externa) / collagen / fibrous;
any three - 1 mark each max
(3)
- (ii) both carry blood;
 between tissues / organs and heart;
 both tubular;
 both have a lumen;
 both have muscle / elastic wall / tunica media;
 both have (smooth) endothelium;
 both have tunica externa / collagen layer;
any six - 1 mark each max
(6)
- (b) plasma contained in blood vessels / liquid part of blood;
 tissue fluid surrounds cells/outside blood vessels;
 plasma contains (plasma) proteins / named protein;
 tissue fluid has no / little proteins;
 plasma carries red blood cells;
 tissue fluid contains no red blood cells;
 plasma carries white blood cells;
 tissue fluid contain few(er) white blood cells;
any six - 1 mark each max
(6)
- (c) excess tissue fluid;
 drains into/enters lymph vessels / lacteal;
 forms lymph;
any two - 1 mark each max
(2)

Total 20 marks

3. (a) Removal / gets rid of;
waste products / harmful or unwanted substances;
of chemical reactions/metabolism;
any two - 1 mark each max
(2)
- uric acid;
urea;
carbon dioxide;
water;
excess salts; max
(2)
hormones;
any two - 1 mark each
- (b) *diagram to show* : Bowman's capsule;
Glomerulus / capillaries;
proximal / distal convoluted tubule;
loop of Henle; max
(3)
any three - 1 mark each
- labels* : glomerulus;
Bowman's capsule;
(proximal) convoluted tubule;
loop of Henle;
(distal) convoluted tubule;
collecting duct; max
(4)
capillaries;
any four - 1 mark each
- (c) excess amino acids produced;
converted to urea;
more urea in filtrate; max
(3)
greater concentration in urine;
any three - 1 mark each
- (d) fall in blood pressure;
ultrafiltration in glomerulus;
requires high blood pressure;
to force substances out of blood;
and into Bowman's capsule;
filtration will stop / be reduced;
reabsorption will stop; max
(6)
urine production will stop / slow down;
any six - 1 mark each

Total 20 marks

4. (a)

<u>nervous system</u>	<u>endocrine system</u>
short term effects; electrochemical / electrical; uses nerves/nervous pathways; localised effect;	long term effects chemical; uses blood for transport; widespread effects;

max
(6)

any three pairs - up to 2 marks each

- (b) mechanism to maintain a factor / water level (in blood);
constant / stable;
despite intake / output;
water level in blood drops / blood more concentrated;
pituitary;
releases ADH;
increases permeability of collecting duct / distal convoluted tubule;
(more) water reabsorbed from filtrate;
water level in blood increases;
feedback / suppresses / stops ADH secretion;
any six - 1 mark each

max
(6)

(apply similar mark scheme to any other hormone chosen)

- (c) increased sweating;
sweat evaporates;
latent heat removed;
vasodilation;
more blood to skin capillaries;
more heat brought to skin;
lost via radiation/convection;
cools body / removes excess heat;
any six - 1 mark each

max
(6)

- (d) (vomiting / diarrhoea) leads to excessive water loss;
from gut / digestive tract / in faeces;
less to be absorbed;
into blood;
less water available for reabsorption;
ADH secretion has little effect;
any two - 1 mark each

max
(2)

Total 20 marks

5. (a) many / lots / large number of cells / fibres;
same / similar / identical;
working together / work / operate as a unit;
by contraction; max
to cause movement of limb / joint / body part; (4)
any four - 1 mark each

(b) biceps contracts;
attached to radius;
attached to humerus / scapula;
via tendons;
which transmit pull / force;
raises forearm / object / arm is bent;
stretches / lengthens triceps;
ref. to antagonistic action;
triceps contracts;
attached to ulna;
stretches biceps; max
arm straightened / object put down; (10)
any ten - 1 mark each

AWARD marks if points made on annotated diagram

(c) muscle not attached to bone / moves bone;
muscle cells interconnected;
not as separate muscles / fibres / bundles;
no antagonistic action;
involuntary / not under conscious control / myogenic;
muscle doesn't tire;
continuous contraction / beating;
doesn't normally operate anaerobically; } or reverse
no lactic acid accumulation; } argument
acts as a pump; max
moves fluid; (6)
any six - 1 mark each

Total 20 marks

6. (a) water; + carbon dioxide; $\xrightarrow[\text{chlorophyll}]{\text{light}}$ glucose; + oxygen; (6)

(b) large surface area;
to absorb maximum/large amount of light; max
short distance for light to penetrate / diffusion of carbon dioxide; (2)
any two - 1 mark each

ACCEPT any other valid points with explanation

(c) (i) converted into amino acids;
and proteins;
(proteins) required for growth;
larger plants; max
larger seeds / fruits / increased yield; (3)
any three - 1 mark each

(ii) eutrophication;
nitrogen fertiliser leaches into streams;
algal bloom / rapid growth of algae;
prevents entry of light into water;
water plants die;
algae die;
aerobic bacteria / bacteria use oxygen;
rapid growth / reproduction rate of bacteria;
cause decomposition;
oxygen content of water depleted; max
fish die/suffocated; (9)
any nine - 1 mark each

Total 20 marks

7. (a) parasite;
lives on surface of body / skin;
between toes;
secretes enzymes;
digests skin / cells / food;
dampness / water necessary;
absorbs products of digested skin;
into hyphae;
via diffusion;
any six - 1 mark each max
(6)
- (b) (i) changing rooms / damp places;
sharing towels / socks;
people walking barefoot;
skin shed from feet of infected person;
contains organism / hyphae / spores;
picked up by uninfected person;
becomes established on new host / person gets disease;
any four - 1 mark each max
(4)
- (ii) wear slippers in changing rooms;
disinfect floor regularly;
treatment of disease;
stop suffers using facilities;
well ventilated footwear to inhibit growth;
dry carefully between toes;
don't share towels, socks etc;
any four - 1 mark each max
(4)
- (c) athlete's Foot direct transmission / no vector;
from person to person / through spores;
malaria requires a vector;
mosquito;
can't be transmitted directly / via a bite;
because organism has to change in mosquito;
organism lives in blood not on surface;
any six - 1 mark each max
(6)

Total 20 marks

8. (a) (i) secretes sebum (antiseptic);
barrier;
covers whole of body / continuous layer;
dead / keratinised cells / cornified layer;
prevents entry of pathogens/micro-organisms /bacteria;*
any two - 1 mark each max
(2)
- (ii) seals wound;
forms scab;
prevents entry of pathogens/micro-organisms/ bacteria;*
any two - 1 mark each max
(2)
* once only
- (iii) phagocytes;
engulf bacteria;
digest / destroy bacteria;
prevents spread of pathogen;
antibodies / lymphocytes produced;
different types / named type;
specific;
clumps pathogen;
or neutralises toxin;
any four - 1 mark each max
(4)
- (b) nicotine;
destroys / paralyses cilia;
increased mucus production;
mucus accumulates;
pathogens not removed;
mucus ideal breeding ground;
warm / moist;
rapid increase in bacterial numbers;
leading to infection of lung tissue;
any four - 1 mark each max
(4)
- (c) catch / suffer from disease;
stimulates white blood cells;
to produce antibodies;
to combat disease / destroy pathogens;
produce memory cells;
which remain in body / are long-lasting;
can respond rapidly / produce antibodies quickly;
so new infection quickly dealt with;
this is active immunity;
can also obtain immunity from mother;
via placenta;
via milk / colostrum;
only lasts for limited time;
this is passive immunity;
any eight - 1 mark each max
(8)

Total 20 marks

9. (a) *diagram*
 large and clear;
 no cytoplasm indicated; (2)
- ref. protein coat / capsomeres;
 nucleic acid;
 as coil / thread;
 no other organelles; (4)
- (b) bacteria are larger / viruses are smaller;
 bacterium has cytoplasm;
 virus no cytoplasm;
 bacterium has cell wall;
 virus no cell wall / has protein coat;
 bacterium few organelles/named example;
 virus no organelles;
 bacterium has cell membrane; max
 virus has no cell membrane; (4)
any four - 1 mark each
- ACCEPT any valid functional differences
- (c) cold caused by virus;
 antibiotics effective against bacteria /
 antibiotics ineffective against viruses; max
 minor infection - risk of overuse of antibiotics / A/W; (2)
any two - 1 mark each
- (d) (i) *polio*
 faeces;
 direct contact ;
 airborne; max
 droplets; (2)
any two - 1 mark each
- (ii) *tuberculosis*
 airborne;
 droplets; max
 untreated milk; (2)
any two - 1 mark each
- (iii) *diphtheria*
 airborne;
 droplets; (2)
- (iv) *gonorrhoea*
 exchange of fluid / passing of fluid;
 during sexual intercourse; (2)

Total 20 marks

PAPER TOTAL 100 MARKS

HUMAN BIOLOGY 7042, CHIEF EXAMINER'S REPORT

Paper 1

General comments

There was a wide variation in the scores achieved by candidates, with some excellent papers being seen by the examiners. There was no evidence to suggest that candidates had insufficient time to complete the paper. Few candidates left parts unanswered. A common difficulty was that many candidates could not work around a question when it asked for explanations of deficiencies or the opposite of the normal situation. The application of knowledge is a skill that requires further development.

Question 1

The diagram proved to be a relatively easy starter for the majority of candidates. A common mistake was for candidates to name the hepatic vein as the hepatic portal vein. Part (c) caused a few more difficulties as the answer 'ultrafiltration' or 'pressure filtration' was required rather than just the term 'filtration', which was often given as the answer. The majority of candidates came up with at least one correct substance in answer to part (c)(ii), with many correctly stating two. The list of acceptable substances included water, urea, mineral salts, toxins and hormones.

Question 2

Identification of the parts of the motor neurone caused problems for many candidates. Most could identify the nucleus but then descended into vague responses such as 'fibres' or 'dendrons', with many leaving blanks. Identification of the neurone proved difficult for many and, of those who were able to identify it correctly as a motor neurone, several could not give adequate reasons to support their judgement. Reference to position of the cell body being at one end and the length of the axon were acceptable reasons. Part (d) was poorly answered. A common mistake was to describe a reflex arc rather than transfer of an impulse across a synapse, which the question was demanding.

Question 3

Identification of the functions of the various parts of the cell proved to be an easy introduction to the question, though many candidates were reluctant to use a letter twice. Part (b) caused problems, with many candidates referring to the nucleus, which was given in the diagram. Some made reference to cell membrane which, again, was given in the diagram. The commonest correct answers were mitochondria and ribosomes, though many mentioned ER but usually did not specify which type. Part (c) caused many problems for candidates. All that was required was for candidates to draw the three cells but with fewer cilia. Common errors included diagrams showing cells that were too big or too small, or even in the wrong proportions. Many candidates left the examiners in doubt as to whether they were showing fewer cilia or the same number. In answer to part (d)(i), few candidates were able to describe the role of the alveoli in terms of allowing the diffusion of carbon dioxide out of the blood and oxygen into the blood. There were various references to breathing gases in and out; a correct reference to gaseous exchange occurring was often all a candidate could manage. In answering part (d)(ii), too few candidates used the information given in the diagrams. Instead, they included references to surface area and loss of elasticity, neither of which could be deduced from the diagrams. References to breakdown of the elastic fibres and an increase in size, or an inability to completely deflate were all acceptable answers. In part (d)(iii), the answer of blood capillary was all too infrequently seen. Candidates should be advised that a film of moisture is not a structure and in any case is internal and not external. Reference to an epithelium was a common incorrect answer.

Question 4

Many candidates scored full marks for part (a), though a common mistake was to transpose the terms canine and incisor. A further common error was to suggest that blood vessels were responsible for sensing pain, rather than nerve endings. The mechanism of tooth decay was not well understood and the importance of brushing teeth was poorly explained by most candidates. There was a lack of appreciation that bacteria feed on food/sugar that is left between the teeth, and in the process produce acid. This acid dissolves the enamel and causes decay. Brushing will remove the food and so the bacteria have no source of acid production. Many candidates insisted on introducing fluoride which has little relevance in this context.

Question 5

This question proved to be the most difficult on the paper overall, with only the very best candidates scoring well. Many candidates were unable to give a full definition of a hormone. Instead, many of them described an enzyme. Reference to hormones being chemical in nature was often expressed as being a 'protein'. Candidates should be reminded that not all hormones are proteins. Few made reference to hormones being secreted by an endocrine gland and not many more described how they are transported in the blood. Many candidates, in answer to part (a)(ii), thought that the site of action of insulin was the pancreas or one of its cellular components. The simple numerical manipulation defeated most candidates in attempting to answer part (b)(i). All that was required was the counting of the number of offspring in the fourth generation with type 2 diabetes out of the total number of offspring in the fourth generation. Arithmetically this was five out of fifteen which gave a proportion of 33% or one in three. Very few candidates could answer part (b)(ii), falling at the first hurdle and failing to identify the correct part of the family tree. The relevant allele is recessive and it was necessary to identify a part of the family tree that had two parents, neither of whom had the condition yet, producing one or more offspring with the condition. There was only one part of the tree in the third and fourth generation that fulfilled this requirement. Most candidates did not appreciate that the condition would have arisen originally as a result of a mutation. Many tried to explain it in terms of excessive sugar intake, or the fact that someone in an earlier generation had had the condition.

Question 6

Approximately equal numbers of candidates omitted to show refraction at the cornea and the lens. Many candidates indicated the rays of light hitting the iris and then allowed them to continue through the iris, showing a limited grasp on the functioning of the eye. Another common misconception was that the image did not come to a focus at the fovea which had been indicated at the back of the eye. The answers to part (a)(ii) were often unclear: a simple reference to the lens becoming thinner was all that was required. The answers to part (b)(i) often had the pupil smaller than the iris despite the fact that the question specifically mentions a dark room. The pupil should have been drawn to be large, a rule of thumb being that it should have had an area greater than that of the iris. The answers to part (b)(ii) were often confused, with vague references to circular and radial muscles contracting and relaxing, though the location of these muscles was often omitted. 'Pupil smaller' and 'iris larger' would have secured the two marks. The answers to part (c) demonstrated that candidates confused 'blind in one eye' as stated in the question with being blind. The majority of candidates progressed little beyond a reference to 3D image formation. Often candidates discussed a normal-sighted person rather than the problems of a one-eyed person in judging distance.

Question 7

This proved to be the most mark-yielding question on the paper. There was some confusion in part (a) between the urethra, which is the correct identification of B, and the ureter. The fluid stored in X was variously described (incorrectly) as 'semen' or 'urea'. Most candidates were unable to score the two marks for part (c) because they did not know that the role of X and Y was to secrete fluids which allows the sperm to swim or to provide nutrients for the sperms. Many candidates said that the glands produced semen, showing a lack of understanding of the term 'semen'. The commonest error in answer to part (d) was to draw the line to the epididymis rather than to the testis. The quality of drawings in answer to part (e) was largely poor. The nucleus should fill most of the head of the sperm and there is also a separate middle piece which was often not shown. Candidates were usually able to pick up two label marks.

Question 8

The enzyme lipase appears not to be well known by many candidates. A common error in answer to part (a)(i) was 'salivary amylase' or just 'amylase'. Many candidates, even if they identified the enzyme correctly, thought that it was produced in the small intestine rather than in the pancreas. A common failing in plotting the graph was to produce an inappropriate scale: one that did not make best use of the graph paper. Despite the question asking that the points be joined by straight lines, many candidates insisted on drawing a curve, including a curve of best fit. Many candidates thought that the optimum temperature was 10°C rather than 30°C. Emulsification of fats was generally well known. The second graph was expected to be of a similar shape to the first, but to be drawn above the first along its whole length. Many candidates insisted on making the starting point of the second graph the same point as the first. Candidates should be advised not to extrapolate graph lines unless they are told that they should.

Question 9

Candidates experienced difficulties in carrying out the simple measurements of the clear areas around the discs. Instead, in many cases they measured the discs themselves. Another common problem was to use the wrong units, despite the fact that the units were given as part of the answer line so there should have been no mistake. Candidates must read the question carefully and answer the one that has been set. The effectiveness of the antibiotics was not well understood. Candidates were expected to make reference to the fact that the larger the clear area, the more bacteria had been killed by the antibiotic. This idea failed to materialise in the minds of many candidates. The answers to part (b) were often very vague, for example 'prevent droplet infection with the infected person'. A reference to using a handkerchief would have been acceptable. 'Don't mix with someone suffering from the disease' was often seen in one form or another. Isolation of the sufferer would have been acceptable. Other possible answers included the use of vaccination, health education and the use of pasteurised milk.

Question 10

In answer to part (a)(i), candidates did not seem to understand the instruction 'label'. Instead, many simply bracketed a pair of chromosomes and a number drew in an extra pair of homologous chromosomes. Candidates found difficulty in determining diploid number of the cell shown, but almost all of them knew the figure of 46 for a human cell. The answers to part (c) often lacked crispness. 'Haploid and diploid' and 'four cells produced as opposed to two cells produced' were acceptable but again, in many cases, candidates failed to answer the question which asked about the cells produced by the two processes.

Paper 2

General Comments

Almost all candidates completed the correct number of questions in each section of the paper. It would help examiners if they remembered to fill in the grid on the front of the paper indicating the questions they had attempted. If it becomes necessary to add to a question after it has been completed, the section added should be clearly labelled and its location indicated at the end of the original question.

Most candidates seemed to have made good use of the mark distribution when planning their responses. In some cases the mark scheme seemed to be rather mark yielding.

There were a number of very good candidates but also a small number for whom this examination appeared inappropriate. Poor use of English made it difficult to understand what some of these candidates were trying to say.

Question 1

This was a popular and frequently high-scoring question. The structure of a protein was well known and the majority described a Biuret test for the presence of a protein. Those who chose Millons test were less sure about the technique and the colour change expected. A few candidates became confused with Benedict's test. It was pleasing that most candidates confined their responses in part (c) to the digestion of proteins which was well known. A small number stopped their account when the material left the stomach. In part (d), the effects of lack of protein in the diet were well known.

Question 2

In part (a), the diagram was frequently poorly drawn with multiple layers in the wall and also unnecessary shading, which only led to confusion. The lumen should have been clearly narrow in diameter in comparison with the artery wall. Some candidates failed to note that only **similarities** in structure and function between veins and arteries were required, and wrote extensive lists of differences which failed to gain credit. In part (b), the plasma was better known than the tissue fluid. Most knew how lymph was formed but some accounts were muddled.

Question 3

Almost all candidates attempted this question and many scored highly on it. Most were able to give some accurate explanation of the term excretion, but some then invalidated part of their answer by talking about faeces as an excretory product. Water and urea were the most commonly identified excretory products, although a few mentioned glucose which should not appear in the urine.

In part (b), the diagrams were very variable in quality and a few candidates drew sections through the kidney instead of the diagram required. The capsule was sometimes drawn as a flat plate and details of the glomerulus were poor, although the labelling was usually good. Explanations in part (c) were usually accurate, but sometimes spoilt by vague language e.g. 'it would be deeper yellow' rather than 'the urine would contain more urea'.

Part (d) was poorly answered, with very few realising that a severe blood loss would result in a reduction in blood pressure, which in turn would affect ultrafiltration. Many talked about lack of oxygen in the blood.

Question 4

There were several ways of planning the response to part (a). Some candidates used a tabular form which made the comparisons easy to follow. In part (b), the best responses came from candidates who used the example suggested (ADH) rather than insulin or progesterone. In the latter case, the complexity of the interactions between the reproductive hormones were not understood. The role of the skin in maintaining an acceptable body temperature during exercise was well known. Candidates really only needed to deal with sweating and vasodilation, although a number also mentioned hairs lying flat and even lack of shivering which was irrelevant. In part (d), most candidates realised that vomiting etc. would lead to a serious loss of water from the body, but few made sensible suggestions as to how this would affect the feedback mechanism.

Question 5

Most candidates were able to define a tissue, but few could apply that definition to skeletal muscle. The mark allocation should have indicated that they had to say more than just 'a group of similar cells'.

In part (b), no diagram was required, although a clear fully-labelled diagram could gain many of the marking points. Candidates are reminded that marks can only be awarded once whether on a diagram or in the text. Too many of the diagrams offered added nothing to the account and many showed incorrect origins and insertions for the muscles. Unless diagrams are fully annotated they are unlikely to be helpful.

In part (c), many candidates wrote two paragraphs: one on cardiac muscle and one on skeletal muscle, but comparisons were often hard to find.

SECTION B

Question 6

This was a popular question and usually high scoring. Almost all candidates could write a word equation for photosynthesis, although a few confused this with respiration. A small number made life unnecessarily difficult for themselves by attempting to write a chemically balanced equation. In part (b), the large surface area of leaves was often linked to light absorption but the thinness, rather than the shorter distance for diffusion, was often said to increase the rate of carbon dioxide diffusion. In part (c), most candidates clearly understood the role of nitrogen compounds in protein synthesis, and the majority were able to describe eutrophication in some detail. Some (usually weaker) candidates suggested that the algae used up all the oxygen in the water!

Question 7

The mark distribution for part (a) should have made candidates realise that just saying that the athletes' foot fungus feeds on the skin was an inadequate response. The fungus is a parasite, not a saprophyte, and digests the outer layers of the skin, frequently between the toes. Digested products are absorbed into the body of the fungus. The transfer of the fungus from one person to another on infected clothing was well known, but few mentioned that it was spores that are usually transferred. Preventative measures were quite well known, but those candidates who just commented on not sharing socks etc. produced inadequate responses. Many neglected to mention the treatment of patients with anti-fungal creams.

In the last section, candidates were meant to consider how the spread of malaria differs from that of athletes' foot. Most candidates commented on the use of a vector in the transfer of the malarial parasite, but few realised that changes occurred to the parasite in the body of the mosquito, without which it would be unable to continue its life cycle in the body of the human. Responses to this section often lacked depth.

Question 8

In part (a), candidates usually realised that the skin presented a barrier to microorganisms when it was unbroken, and a number commented on the dead, keratinised outer layer. Candidates should realise that the term 'germ' is not acceptable at this level. Many candidates concentrated on controlling blood loss rather than on preventing the entry of micro-organisms when discussing the importance of blood clotting. The function of white blood cells was well known.

In part (b), too many concentrated on the evils of smoking and there was considerable confusion over the roles of various components of cigarette smoke in destroying or inactivating the cilia.

In part (c), many failed to note that it was natural immunity, not vaccination, that they were expected to deal with. Only a few candidates suggested it would occur after catching the disease, and very few mentioned transfer of antibodies from mother to child, either across the placenta or in the breast milk. This section was poorly answered.

Question 9

This was a very popular and usually high scoring question.

The diagram in part (a) was of very variable quality. To be useful a diagram should be fairly large and fully labelled. The question asked for a diagram to illustrate the answer, implying that a written account was also needed, but some candidates omitted this. In part (b), both structural and functional differences were acceptable but few referred to differences in size. In part (c), most realised that the common cold is caused by a virus, but few made the point that most antibiotics are ineffective against viruses. Many suggested that that reason for not using them was that viruses frequently mutate.

In part (d), most candidates knew the principle methods of transmission for the diseases listed but details, such as how the droplets were transferred, were often lacking. Few mentioned that exchange of fluids was involved in the transfer of gonorrhoea.

HUMAN BIOLOGY 7042, GRADE BOUNDARIES

Grade	A	B	C	D	E
Lowest mark for award of grade	138	117	97	87	68

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