

# Mark Scheme with Examiners' Report

## GCE O Level Human Biology (7042)

January 2005

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## HUMAN BIOLOGY 7042, MARK SCHEME

### Paper 1

1. (a) diagram quality 1 or 0; 1
- cytoplasm;  
cell membrane;  
nucleus; 3
- (b) red blood cells do not have a nucleus / cannot divide;  
red blood cells have a more elastic membrane;  
red blood cells contain haemoglobin;  
red blood cells are smaller;  
red blood cells have a biconcave as opposed to an irregular shape;
- Any two - 1 mark each 2
- (c) (i) glucose;  
carbon dioxide; 2
- (ii) as ATP; 1

**Total 9 marks**

2. (a)

Substance	Part played in body
calcium	formation / growth of teeth / bones / needed for blood clotting;
iodine	formation of thyroxin / growth hormone;
vitamin A	formation of rhodopsin / visual purple / helps vision in dim light / functioning of retinal cells;
vitamin B	formation of connective tissue / skin / prevents beriberi / pernicious anaemia;

4

- (b) lack of protein for new cells / cell division / reduced healing of wounds;  
reduced growth;  
wasting of muscles / body may metabolise muscle protein;  
lack of enzymes / hormones / haemoglobin;  
kwashiorkor / symptoms of oedema;  
poor immune system;

Any three - 1 mark each 3

- (c) small increase in intake / energy / calories (to provide for fetus);  
 \* increase food containing iron needed for fetus (red blood cells);  
 \* increase food containing calcium needed for fetus (bones / teeth);  
 \* increase food containing more mineral salts (if no named mineral quoted);  
 increase food containing protein needed for fetus;  
 no / low alcohol intake (as can damage fetal cells);  
 increased vitamins / folic acid / other named vitamin;

Any two - 1 mark each

2

**Total 9 marks**

3. (a) trachea labelled correctly;  
 ribs labelled correctly;  
 diaphragm labelled correctly;

3

(b)

structure	action or change during inspiration
intercostal muscles	contract / pull ribs up and out;
diaphragm	contracts / flattens;
thoracic cavity (thorax)	increases in volume / decreases in pressure;

3

- (c) inspired air has more oxygen than expired air;  
 inspired air has less carbon dioxide than expired air;  
 inspired air has less water than expired air;  
 inspired air cooler than expired air;  
 accept percentages if quoted correctly;

Any two - 1 mark each

2

paralyses / inactivates / destroys cilia;  
 cannot beat to move mucus;  
 mucus traps bacteria / pathogens / viruses / microbes;  
 more bacteria / pathogens in lungs;

Any three - 1 mark each

3

**Total 11 marks**

4. (a) (i) ileum;

1

- (ii) digestion;  
 absorption (of nutrients);  
 more surface area (for absorption);  
 more time for digestion / absorption;

Any two - 1 mark each

2

- (b) (i) 2 correct readings / 120 cm : 660 cm;  
correct method;  
2:11 / 2/11 / 18.2%; 3
- (ii) absorption of water / formation of faeces / some fibre broken down  
formation of vitamin K; 1
- (c) (i) liver; 1
- (ii) emulsifies / increase surface area / breaks down large droplets of  
fats; 1
- (iii) provides alkaline pH / provides optimum pH for enzymes / activates  
enzymes; 1

**Total 10 marks**

5. (a) X - left atrium  
Y - left ventricle;  
X and Y identified as right - 1 mark maximum 2
- (b) cuspid valve (with tendons) in correct position;  
looks able to close;  
  
semilunar shaped valve;  
in correct position; 4
- (c) ventricle contracts;  
blood forced up into the flaps of valve;  
pushes valve shut;  
tendons prevent valve being pushed inside out;  
  
Any two - 1 mark each 2

**Total 8 marks**

6. (a) glucose;  
amino acids;  
old red blood cells;  
oxygen;  
alcohol / drugs;  
vitamins A / D / E / K;  
  
Any two - 1 mark each 2
- (b) (i) deamination; 1
- (ii) amino acids; 1
- (iii) kidney; 1
- (c) plasma; 1

**Total 6 marks**

7. (a) (i) water;  
glucose;  
amino acids;  
vitamins / named vitamin;  
mineral salts / named mineral salt;  
oxygen;  
hormones;  
antibodies;  
alcohol;  
drugs / nicotine;  
pesticides;
- Any two - 1 mark each 2
- (ii) diffusion; 1
- (iii) rich blood supply;  
large surface area;  
provided by villi;  
good diffusion gradient;  
thin epithelium;
- Any two - 1 mark each 2
- (b) (i) amniotic fluid; 1
- (ii) spreads pressure / cushions / shock absorber / protection against physical damage; 1

**Total 7 marks**

8. (a) (i) Angela;  
Jane;  
Jack;
- Any two - 1 mark each 2
- (ii) normal / carrier / does not have / show condition; 1
- (b) (i) **Nn**; 1
- (ii)  $Nn \quad \times \quad Nn$  parents;  
 $N \quad n \quad \quad N \quad n$  gametes;  
 $NN \quad Nn \quad Nn \quad nn$  correct cross;
- all phenotypes identified;  
Accept use of Punnet square 4
- (iii) 25% / 1 : 3 / 1 in 4 / 0.25; 1

- (c) malarial parasite multiplies in red blood cells;  
 parasite less able to reproduce in sickle cells / reason;  
 selective advantage / natural selection;  
 sickle cell sufferer less likely to suffer / die from malaria;
- Any two - 1 mark each 2

**Total 11 marks**

9. (a) suitable scales; (horizontal axis not to start from 0)  
 at rest data plotted correctly;  
 active data plotted correctly;  
 points joined by lines;  
 key / lines labelled; 5
- (b) 18 - 3.5;  
 14.5;  $\pm 0.2$  2
- (c) work requires energy / increases muscle activity;  
 respiration;  
 more heat released / increases body temperature;  
 sweating cools the body;  
 higher metabolic rate;
- Any three - 1 mark each 3
- (d) ineffective / not needed in aquatic environment / sweat cannot  
 evaporate (and cool body); 1

**Total 11 marks**

10. (a)

Substance	from	to	for the process of
	lungs / alveoli;		
	ileum / small intestine / liver;		formation of cell membrane / collagen / strengthening of gums;
iron;		bone marrow / long bones / ribs;	
		kidney;	osmoregulation / absorption of water;

7

- (b) (i) veins; 1
- (ii) have valves / thinner walls / less muscle in wall / wider lumen / lower pressure; 1
- (c) (i) blood proteins / clotting proteins / fibrinogen / thrombin / platelets / calcium ions; 1
- (ii) in the plasma; 1

**Total 11 marks**

11. (a) (i) bacteria / fungi / decomposers / saprophytes / saprotrophs; 1  
(ii) allow oxygen to enter; 1  
(b) carbon dioxide; 1  
(c) crop plant;  
\* herbivore / named / drawn herbivore;  
\* carnivore / named / drawn carnivore;  
\* organisms in correct order;  
arrows in correct direction;  
\* = relevant to food chain
- Any four - 1 mark each 4

**Total 7 marks**



**Paper 2**

1. (a) mitosis:

- \* DNA replicated / chromatids formed;
- \* in interphase / resting stage;
- \* nuclear membrane disappears;
- \* chromosomes become visible;
- \* award if meiosis
- attach to spindle at equator;
- spindle contracts;
- separating chromatids / chromatids pulled to opposite ends of cell;
- chromosome number is maintained;
- new nuclear membranes appear;
- two daughter nuclei formed;

Any six - 1 mark each

**Max 6**

- (b) DNA code;  
 forms (m)RNA;  
 unzips / reveal bases / transcription;  
 nucleotides position according to code / 3 nucleotides / 3 bases code  
 for 1 amino acid;  
 uracil replaces thymine;  
 leaves nucleus;  
 travels through cytoplasm;  
 to ribosomes;  
 codon / triple code;  
 amino acids arranged in order / ref. to anticodon;  
 peptide bonds;  
 sequence determines type of protein;

Any eight - 1 mark each

**Max 8**

- (c) iodine shows (presence of) starch;  
 Benedicts test for sugars;  
 water baths / alternative method at 20 °C & 30 °C;  
 same volume of starch & enzymes / fair test;  
 amylase breaks starch into sugars / maltose / reducing sugar;  
 samples taken / or other observations;  
 comparison of time for reaction to occur;  
 determination of end point;

Any six - 1 mark each

**Max 6**

**Total 20 marks**

2. (a) support / maintains shape;  
pelvic girdle;
- protection;  
skull for brain / eyes / ribs for lung & heart;
- movement / muscle attachment;  
leg bones / femur or other;
- accept any suitable example such as - role in breathing, as levers, red blood cell formation
- 3 pairs - 2 marks each Max 6
- (b) diagram quality = 2, 1, or 0 marks 2  
named bone;  
ligament;  
cartilage;  
synovial fluid;  
named muscle / tendon;
- Any four - 1 mark each Max 4
- (c) (cartilage) slippery / tough;  
allows friction-free movement / shock absorber;  
(ligaments) strong / elastic;  
hold bones together / prevent dislocation;  
bones shaped to fit one another;  
(synovial membrane) secretes fluid;  
synovial fluid acts as lubricant / shock absorber;  
muscles move joints;  
attached by tendons that run across joint / transmitting pull / are inelastic;
- Any six - 1 mark each Max 6
- (d) elbow joint - single plane of movement / hinge / 180°;  
shoulder joint - three planes of movement / all round movement / universal; 2
- Total 20 marks**
3. (a) hand from heat / sharp object;  
removed instantly from stimulus;  
decreases chance of damage;  
automatic / no brain involvement;  
accept any other suitable example 3

- (b) diagram quality 1 or 0 marks; (must have synapses in grey matter) 1  
 Drawn and labelled:-  
 grey matter;  
 white matter;  
 cell body (ganglion) on sensory neurone;  
 sensory neurone;  
 relay / multipolar neurone;  
 motor neurone;  
 receptor;  
 effector;  
 synapse;

Any five - 1 mark each Max 5

- (c) synaptic knob / presynaptic membrane;  
 releases chemicals/ neurotransmitter;  
 acetylcholine;  
 diffuses across gap;  
 stimulates next neurone / post synaptic membrane;  
 second chemical deactivates acetylcholine;  
 allowing next impulse to pass;

Any five - 1 mark each Max 5

(d)

Hormonal	Nervous
slow effect;	fast effect;
long term;	short term;
chemicals;	electrical impulse;
transport in blood;	transport along neurone;
general as well as specific targets	specific destination;

Any three pairs - 2 marks each Max 6

**Total 20 marks**

4. (a) diagram quality 2, 1 or 0; (For 2 marks must show all structures in correct layer and capillaries to sweat glands etc) 2

dermis;  
 fat layer;  
 epidermis;  
 malpighian layer;  
 receptor / named receptor / nerve ending;  
 capillaries;  
 hair follicles;  
 sweat gland;  
 sebaceous gland;  
 hair erector muscle;  
 cornified layer;

Any six - 1 mark each Max 6

- (b) (i) cornified layer / dead cells;  
 thicker in places frequently damaged / eg;  
 waterproof;  
 constantly replaced (from below) 3
- (ii) sensory / temperature receptors detect rise in temperature;  
 nerve transmits information / impulse to brain;  
 brings about (increased) sweating;  
 passes onto skins surface;  
 sweat / water evaporates;  
 latent heat taken from skin;  
 lowers skin temperature;  
 also vasodilation;  
 arterioles to skin (upper layer) more blood;  
 (to) capillaries in skin;  
 more blood flows through skin;  
 more heat loss by radiation / convection;  
 hairs lie flat;

Any nine - 1 mark each

**Max 9**

**Total 20 marks**

5. (a) (i) role of liver;  
 blood sugar level above normal;  
 insulin;  
 glucose to glycogen;  
 greater uptake of glucose by liver cells;  
 lower blood glucose;  
 stores glycogen;  
 blood sugar level falls;  
 glycogen to glucose;  
 by glucagon;  
 raises blood glucose;  
 hormones produced by pancreas;
- (ii) Any six - 1 mark each **Max 6**  
 removes alcohol;  
 removes drugs;  
 from blood;  
 breaks down / converts into less harmful substances;
- Any two - 1 mark each **Max 2**
- (b) (i) abdomen;  
 below diaphragm;  
 attached to back abdominal wall;
- Any two - 1 mark each **Max 2**

- (ii) (blood enters) glomerulus;  
 at high pressure;  
 knot of capillaries;  
 in Bowman's capsule;  
 (ultra) filtration / under pressure;  
 plasma passes through wall / into nephron;  
 filtrate passes along nephron;  
 glucose reabsorbed in first convoluted tubule / area described;  
 active transport / requires energy;  
 most of water reabsorbed;  
 urea passes into pelvis with rest / not reabsorbed;  
 pass down ureter;  
 to bladder;  
 passed out via urethra / excreted;

Any ten - 1 mark each

Max 10

Total 20 marks

6. (a) diagram quality 2, 1 or 0 marks;  
 cell membrane;  
 chromosomal strand;  
 cell wall / polysaccharide wall;  
 cytoplasm;  
 flagellum; (not necessary for diagram mark)  
 slime capsule; (not necessary for diagram mark)

2

Any three - 1 mark each

Max 3

- (b) **EITHER**  
 saprophyte;  
 feeds on dead matter;  
 secretes enzymes to digest food;  
 absorbs products of digestion;  
 brings about decay;

**OR**

- parasitic;  
 obtains food from living host / animal / plant;  
 enters body / tissues / cells of host;  
 causes loss of nutrients (damage to host);  
 causes disease;

Any four (from one alternative) - 1 mark each

Max 4

- (c) move to site of infection;  
lymphocytes / one type of white blood cell;  
provide antibody;  
in response to antigen;  
kills bacterium (once);  
specific;  
phagocytes / second type of white blood cell;;  
moves towards bacterium;  
engulfs bacterium/ phagocytosis;  
reference to antitoxins;

Any six - 1 mark each

**Max 6**

- (d) contaminated food on stalls , in shops etc;  
water;  
carriers working with food in public places;  
passes with faeces;  
into drinking water;  
on plants/ shellfish;  
chance greater in largely populated areas;  
where hygiene is poor / hands unwashed;  
carried by houseflies;

Any five - 1 mark each

**Max 5**

**Total 20 marks**

7. (a) (i) mosquito is vector;  
malarial parasite in human blood;  
microscopic;  
(female) mosquito feeds on human blood;  
requires protein from blood / requires blood to produce eggs;  
parasite passes into salivary glands;  
passes into host when mosquito bites;

Any six - 1 mark each

**Max 6**

- (ii) louse is vector;  
lice feeds on human blood.  
lives on / attaches to hair;  
bites scalp;  
sucks blood (little damage);  
blood may contain typhus rickettsia;  
excretes typhus rickettsia in faeces;  
causes scratching - rickettsia may be rubbed into wound;

Any four - 1 mark each

**Max 4**

- (b) (i) use of fungicides (as sprays or creams);  
 named fungicide;  
 disinfection of showers / foot baths / changing room floors;  
 wash and dry thoroughly between toes;  
 do not go barefoot;  
 wear well ventilated shoes;  
 do not share socks / towels;

Any five - 1 mark each

**Max 5**

- (ii) antibiotics;  
 eg penicillin;  
 use of condom / femidom;  
 reducing number of partners / remain with one partner;  
 tracing infected sex partners;  
 education;

Any five - 1 mark each

**Max 5**

**Total 20 marks**

8. (a) diagram quality 1 or 0;

**1**

mass of hair-like threads called hyphae;  
 mass itself called mycelium;  
 fruiting bodies/ sporangia / mushrooms arise from hyphae;  
 hyphae not divided into cells;  
 walls of hyphae made of chitin;  
 reference to unicellular structure of yeast;

**possible labels on diagram of yeast cell:**

vacuole;  
 nucleus;  
 cell wall;  
 cytoplasm;  
 cell membrane;

Any five - 1 mark each

**Max 5**

- (b) (green plant) makes own food;  
 photosynthesis / description;  
 chlorophyll;  
 produces materials needed (no digestion);  
 (fungus) parasitic or saprophytic;  
 no chlorophyll;  
 depends on other organisms;  
 external digestion;  
 absorption of ready made food;

Any six - 1 mark each

**Max 6**

- (c) decomposition of dead matter;  
yeast in alcohol production / brewing / wine making;  
anaerobic respiration/ fermentation;  
yeast in bread making;  
respiration (bubbling) makes dough rise;  
antibiotics;  
eg penicillin from penicillium / streptomycin from streptomyces /  
named example;  
foods: eg mushrooms/ truffles;  
used to flavour some cheeses;  
animal feed/ single cell protein/ Quorn;  
synthesise vitamins;

Any eight - 1 mark each

**Max 8**

**Total 20 marks**

9. (a) (i) hygienic disposal of urine / faeces;  
thorough washing of hands after use of toilet / before preparing  
food;  
keep fingernails short;  
avoid use of sewage as fertiliser;  
purification of drinking water;  
only wash salads in treated water;  
thorough cooking of food;  
treatment of patient;

Any five - 1 mark each

**Max 5**

- (ii) T T testing of milk / cattle / don't drink milk from infected  
cattle;  
pasteurisation of milk;  
screening / mass X rays;  
no spitting / use of hankies;  
B C G test;  
vaccination;  
improved diet etc;  
antibiotics / streptomycin to kill bacteria;  
isolation of patients / avoid overcrowding;

Any five - 1 mark each

**Max 5**

- (iii) single partner;  
use of condoms during sex;  
tracing contacts;  
treating secondary infection with antibiotics/ healthy diet;  
using drugs to boost immunity;  
not sharing needles / providing needles for drug addicts / razors  
/ toothbrushes;  
sex education;

Any five - 1 mark each

**Max 5**



- (b) carbon monoxide;  
reduces oxygen carrying capacity of blood/ forms;  
carboxyhaemoglobin;  
sulphur dioxide;  
from burning fossil fuels;  
irritates lining to lungs;  
lead;  
harms developing nervous tissue;  
oxides of nitrogen irritate lungs;

Any five - 1 mark each

**Max 5**

**Total 20 marks**

## HUMAN BIOLOGY 7042, CHIEF EXAMINER'S REPORT

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### Paper 1

#### General Comments

A wide range of scores was awarded and the Examiners saw some very good papers. Some candidates could have scored higher marks by reading the questions with sufficient care. These candidates tended to focus on a single word and then write down all they knew about the subject, which did not always coincide with what was required of the question. In many cases, candidates did not use a sharp pencil or ruler when drawing diagrams, which consequently were of poor quality. Candidates should make sure they have the tools necessary to draw accurate diagrams. In some questions, where one or two named examples were required, some candidates gave lists. The Examiners will not select correct answers from lists.

#### Question 1

- (a) Some candidates drew cells with cilia and despite being asked to draw a single cell, often drew several. Details that could only be seen using an electron microscope were often included. On some occasions mitochondria were shown that were larger than the nucleus.
- (b) Correct comparisons, such as haemoglobin compared with no haemoglobin, were often given but many candidates wrote that red blood cells were 'round' rather than biconcave.
- (c) Some candidates insisted on giving chemical formulae.
- (d) Glycogen, glucose and starch were among the incorrect answers seen. The correct answer was ATP.

#### Question 2

- (a) Some candidates gave the consequences of a deficiency of the named mineral ion/vitamin rather than stating its use. Consequently, it was often only the answer for calcium that scored a mark because candidates were aware of its role in bone formation. However, even amongst these candidates, a common mistake was to suggest that it was required for healthy bones. This was not precise enough, as bone formation or strengthening was the required answer. Few candidates mentioned thyroxine formation as a consequence of iodine uptake, a common mistake being to 'prevent goitre'. Again, to 'prevent night blindness' was a common incorrect answer to the need for vitamin A, and virtually no candidates gave a correct *function* for vitamin B.
- (b) Candidates tended to describe the role of proteins rather than the results of deficiency. Reference to inadequate growth, poor cell formation and tissue repair plus a compromised immune system were the expected answers.
- (c) This was generally well answered, but there was a tendency to list a number of changes, including several that were incorrect. Candidates may find it helpful to check the mark allocation. Only two changes were required for the two marks.

### Question 3

- (a) A common mistake was to label the intercostal muscles rather than the ribs.
- (b) The action of the intercostal muscles and diaphragm were well known. However, a common weak answer was the suggestion that the thoracic cavity increased in size, without mention of 'volume'.
- (c) The question demanded a comparison be made but all too often this was not given by the candidates. Too many talked about inspired air containing oxygen and expired air containing carbon dioxide, without any references to the relative amounts in each.
- (d) This section was poorly answered. Many candidates thought that the cilia moved the bacteria directly and that the effect of nicotine was to cause an increase in mucus secretion. A common error was to use the term 'germs'. This is biologically incorrect terminology and at this level will not score marks.

### Question 4

- (a) Part (i) was answered correctly by the majority of candidates, but in part (ii) many did not appreciate that the length of the ileum increased the time available for digestion/absorption.
- (b) The calculation was poorly attempted, and where candidates realised the need to calculate the length they often then simply gave the length(s), rather than determine the proportion. Consequently, only a minority of candidates provided the correct answer of 2/11.
- (c) Parts (i) and (ii) were generally well answered, though some candidates answered that bile chemically digests the fats. However, part (iii) caused many problems with a large number of vague answers such as 'help the digestion'. Few referred to the role of bile in providing optimum pH conditions for the pancreatic enzymes or to neutralising the acid chyme.

### Question 5

- (a) This part was answered correctly by the majority of the candidates.
- (b) Many candidates placed the position of the semi lunar valves much too high in the aorta/pulmonary artery. An understanding of how the heart works would have helped candidates' diagrams. Some candidates drew the flaps the wrong way round, meaning they would close when blood tried to flow through them in the correct direction. Others drew flaps that were too short, meaning they would not close when the blood attempted to flow back. This latter point was true of the cuspid valve.
- (c) Some candidates mentioned rather vaguely about blood trying to flow back but failed to discuss how and why this happened, and what effect it would have on the flaps of the valves.

### Question 6

- (a) Water, carbon dioxide and urea were common incorrect answers.
- (b) Only part (ii) caused any particular problems, with 'protein' and 'ammonia' as common incorrect answers.
- (c) This was well answered by most candidates.

### Question 7

- (a) 'Protein' was a common incorrect answer though most candidates scored both marks for part (i). 'Diffusion' was all that was needed to answer part (ii). However, many candidates gave answers that were more appropriate to part (iii). In part (iii) the answers were often vague, for example 'blood supplies are close to each other'. There were few references to villi increasing the surface area, which should have been the theme of any answer.
- (b) A surprisingly large number of candidates were unable to identify the amniotic fluid in answer to part (i). The answers to part (ii) often mentioned 'protect' but failed to go any further. This was not enough to gain the mark. A reference to protection from knocks was needed to secure the mark.

### Question 8

- (a) Candidates were usually correct in their answers to part (a)(i). Many in answer to (a)(ii) gave genotype rather than phenotype and where phenotype was given it was thought that George was a sufferer.
- (b) Most combinations were given, though the majority were able to correctly identify Nn as the correct genotype in part (i). A mistake made by a significant number of candidates was to use X and Y chromosomes although this is not a sex-linked condition. In a minority of cases candidates did not use the letters N and n despite being told to in the question. Following the instructions was essential to gain full marks. In part (ii) some candidates failed to score marks because they did not give parental genotypes or gametes. In some cases they failed to indicate the relevant phenotype for the particular genotype.
- (c) Only a handful of candidates scored any marks at all for this section. Some candidates made reference to the fact that the Plasmodium organism lived in the red blood cells. However, candidates did not understand that the allele conferred a selective advantage on those individuals who possessed the allele because of the resistance to malaria that it conferred on such people.

### Question 9

- (a) Candidates should take care when constructing graphs like this one. This graph was often badly constructed. Many candidates did not use the graph paper appropriately, and squashed the graph into one small section of the grid. Some candidates did not realise that the axes do not have to start at zero. Both these factors led to poorly drawn graphs whose points were often drawn freehand rather than with a ruler.
- (b) Mistakes made in (a) led to difficulties in making correct readings to answer this question. This led to incorrect calculations, though candidates were given credit where the wrong figures were used if the method employed was correct.
- (c) Many candidates simply repeated the stem of the question, referring to the fact that more sweat was produced. They did not relate this to the fact that increased activity demanded the expenditure of more energy, generated by increased respiration, with extra heat being released which would raise body temperature.
- (d) Many candidates thought that the water kept the temperature of the animal under control, and did not realise that sweat does not evaporate in water and would therefore be superfluous.

### Question 10

- (a) Part (a) was poorly answered, and few candidates earned maximum marks. Although most candidates appreciated that the oxygen came from the lungs/alveoli, many stated that it came from the air. An even greater number thought that vitamin C came from citrus fruit rather than from the ileum and that the reason that it was needed was to develop 'strong teeth'. Few candidates appreciated that iron was needed by the bone marrow to manufacture red blood cells, though more recognised the role of ADH.
- (b) Although the question asked for the type of vessel, many candidates gave a named vessel, which did not answer the question. However, examiners were prepared to accept 'vena cava'.
- (c) Part (i) was not well answered and 'platelets' was a common answer. It is debatable as to whether they can be classified as a 'substance', but the answer was given credit. Many candidates stated substances that are formed during the process of blood clotting. Part (ii) was well answered.

### Question 11

- (a) Part (a)(i) was generally well answered. In part (ii) a common incorrect answer was 'air'.
- (b) Most candidates were able to answer this correctly.
- (c) There was no mark in the scheme for simply giving the term 'carnivore' in the food chain, as this was included in the stem of the question. Consequently many candidates lost the mark for a named carnivore. A minority drew arrows facing the wrong direction but most candidates scored four marks.

## Paper 2

### General Comments

The majority of candidates appeared to have had adequate time to complete the paper, with very few answering more or fewer than five questions. There was greater polarisation this year between very strong candidates and a small number of candidates who seemed to lack the depth of knowledge required in some sections. The overall standard of written English was very high but there was evidence of careless reading of questions. Many candidates appeared to be less well prepared for the material examined in section B of the syllabus, although all questions produced high scores for some candidates. Some candidates did not know how to complete a scientific diagram. Candidates who know their drawing skills are weak should think very carefully before choosing questions involving a diagram. Diagrams that are not fully labelled or annotated are unlikely to gain full credit.

### Section A

#### Question 1

This was the least popular question in section A but some of those who chose it scored highly.

- (a) The majority of candidates identified the type of nuclear division as mitosis and were familiar with its stages in outline. There was some confusion over details such as when the spindle appeared or the nuclear membrane disappeared but many

candidates gained maximum credit on this section. Many diagrams were confusing and sometimes unlabelled but the accounts were often good.

- (b) In this section the order of events was often inaccurate. Most realised that DNA was related to RNA but they were unable to explain the relationship and several suggested that one turned into the other. The role of ribosomes was usually mentioned but again details were often lacking.
- (c) This section was very poorly answered and most candidates were unable to show any knowledge of experimental details. There was also evidence of careless reading of the question, as candidates wrote about the effect of temperature on enzyme controlled reactions rather than describing the experiment.

### Question 2

This was the most commonly answered question on the paper and was frequently high scoring.

- (a) The functions of the skeleton were well known and most candidates quoted examples of the parts involved in each function. The question asked for three functions and so those who only quoted three examples of protection could not gain maximum credit.
- (b) Candidates were expected to draw and label the elbow joint, not a generalised synovial joint. Candidates should make sure their diagrams are clear and of appropriate size. In some cases the whole diagram was so small that it was almost impossible to distinguish the structures in the elbow joint. There was no need to include the shoulder joint or details of the wrist and hand.
- (c) The roles of cartilage and synovial fluid were well known and many also gave details of ligaments and tendons. A number of candidates misunderstood the question and concentrated on the antagonistic actions of the triceps and biceps muscles. Candidates should take care to read the question carefully.
- (d) Most candidates were able to describe differences in the range of movements possible at the two joints.

### Question 3

It was pleasing to find that a significant number of candidates chose a question on a reflex arc and scored highly on it.

- (a) Most candidates described the reflex involved in removing the hand from a hot object and the value of the response was well understood.
- (b) Some of the diagrams were very well drawn and fully labelled. However, some candidates showed the relay neurone and its associated synapses in the white matter, and the receptor and effector organs were often not really clear.
- (c) The secretion of a chemical at the synapse was generally known, but its movement by diffusion through the synaptic cleft and generation of another impulse at the post-synaptic membrane was less clearly understood. Some candidates wrote confused answers referring to electrochemical impulses.

- (d) Most candidates gave very clear differences between the nervous and the hormonal systems. Candidates should appreciate that if three differences are requested, only the first three given will count for marks.

#### Question 4

This was also a popular question, though results were mixed.

- (a) The diagrams ranged from very good to very poor. In some cases untidy label lines made it difficult to see what was intended. Most candidates realised that there were three layers to the skin, but the position of the adipose layer in the diagrams varied considerably. Most candidates placed structures such as sweat glands, nerve endings and capillaries in the dermis, but the boundary between dermis and epidermis was often obscured.
- (b)(i) Candidates should take care to read the question carefully. Many candidates misunderstood the question and discussed control of bleeding, defence against pathogens and even temperature control. Few mentioned the waterproof barrier provided by the cornified layer or that the layer of dead cells was continuously replaced from below.
- (b)(ii) Candidates dealt with this section well. Most described the role of the sweat glands and also of vasodilation. This time candidates' answers showed fewer capillaries moving up and down in the dermis. Not reading the question with enough care led some to describe irrelevant mechanisms involved in temperature regulation.

#### Question 5

This was a popular question and candidates often scored highly.

- (a)(i) This was well answered and some candidates gave very detailed accounts. There was some confusion as to where insulin and glucagon were produced, with a significant minority of candidates believing that this occurred in the liver, while others claimed that the insulin brought about glycogen production without explaining its role in stimulating the activity of the liver cells.
- (a)(ii) This section was not well answered, with many candidates confusing detoxification with deamination. Alcohol was sometimes mentioned but drugs rarely so.
- (b)(i) The position of the kidneys was rarely described accurately. A more precise description was required than comments such as 'below the stomach', for example.
- (b)(ii) The role of the kidney was well known, and many candidates described events in Bowman's capsule and reabsorption along the renal tubule in considerable detail. Once again some candidates wasted time by dealing with the formation of urea in the liver and its transport to the kidney.

## Section B

Many candidates scored well in individual questions in this section, but in general it proved to be less well answered than section A.

### Question 6

This was a popular and frequently high scoring question.

- (a) Diagrams were often of a high standard and most candidates labelled them fully.
- (b) Candidates were expected to describe either saprophytic or parasitic nutrition although a few described the nutrition of chemotrophic bacteria. The level of knowledge here was often high.
- (c) Most candidates were able to describe the response of the white blood cells to the presence of pathogens, often gaining maximum credit.
- (d) This proved to be the weakest section of the question for candidates, and many candidates were unable to answer it fully. The question was about the spread of typhoid, not measures to control it. Some candidates just quoted general methods by which diseases spread, rather than those specific to typhoid.

### Question 7

This was a popular choice but many candidates failed to score well by missing the precise demands of the question.

- (a)(i) Those candidates who confined their response to the relationship between the two organisms and the role of the mosquito as a vector for plasmodium usually scored highly, but a number of candidates dealt with the life cycle of the mosquito and that of plasmodium within the human, which were not really required.
- (a)(ii) The role of the louse as a vector for typhus was not really appreciated, although most gave details of how the louse would affect humans.
- (b)(i) In this section candidates were asked to deal with the treatment of athletes' foot and measures to prevent the spread of this infection. A number of the measures suggested were too general, such as 'good hygiene', but most scored well in this section.
- (b)(ii) The use of condoms to limit the spread of gonorrhoea was well known, but a surprising number claimed that there was no treatment for the disease. Candidates should beware of using the phrase 'safe sex' without explanation of what this means.

### Question 8

This was by far the least popular question in this section but again there were very high marks gained by some candidates.

- (a) The diagrams here were poor and some candidates were unable to answer any of this part. Those who attempted it were often unable to show any knowledge of the structure of a fungus.
- (b) The nutrition of the green plant was well known and many candidates also described extra-cellular digestion in fungi leading to decomposition.



- (c) This section was often well answered, with almost all candidates referring to the food industry, especially baking and brewing. Production of antibiotics was usually mentioned, but specific biological knowledge was required, rather than references to 'medicines' and 'drugs'.

**Question 9**

- (a)(i) Ascaris was generally not well known and many of the control measures suggested either referred to other parasites such as bilharzia, or were far too general, such as food hygiene. Most candidates managed to mention proper disposal of faeces however.
- (a)(ii) This was far better known and a number suggested pasteurisation of all milk as well as isolation of patients, testing of contacts, and mass vaccination.
- (a)(iii) Most were aware of the need for health education as well as the need to use condoms and restrict the number of partners. The phrase 'free sex' was frequently used but without an explanation it is not clear what this means.
- (b) Most described the problems caused by carbon monoxide emissions in some detail. The problems caused by sulphur dioxide were dealt with by many candidates, although these were not always related to human health. Some candidates included material on global warming which was not really relevant to the question. Few references were made to other components of car exhaust fumes such as oxides of nitrogen or lead compounds.

**HUMAN BIOLOGY 7042, GRADE BOUNDARIES**

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Grade	A	B	C	D	E
Lowest mark for award of grade	127	106	86	76	55

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

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