

CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the October/November 2012 series

5096 HUMAN AND SOCIAL BIOLOGY

5096/21

Paper 2 (Theory), maximum raw mark 100

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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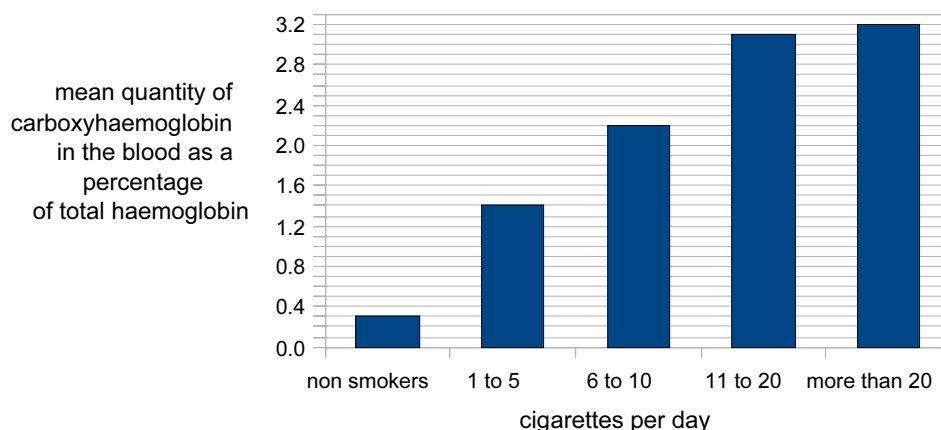
Section A

- 1 (a) (i) small intestine / ileum;
- (ii) glucose;
wide / large / high surface area;
microvilli; (*reject* hairs)
diffusion;
into blood / capillary / bloodstream;
(maintains) concentration gradient;
(thin) epithelium; [max 4]
- (b) to allow time to reach stated temperature / equilibration / AW; [1]
- (c) blue-black colour (throughout the 5 minutes);
starch present;
not affected by amylase / enzyme;
A 0 °C enzyme deactivated / AW;
E 72 °C enzyme denatured; (*reject* killed) [max 3]
- (d) orange-red colour - no starch;
starch absent / removed / all broken down;
by amylase;
B 18 °C (negative for starch at) 5 minutes / enzyme works slowest (of these 3);
C 36 °C (negative for starch at) 3 minutes / optimum temperature;
D 54 °C (negative for starch at) 4 minutes / enzyme works slower (than 36); [max 4]
- (e) starch is insoluble / forms sol / suspension / not true solution;
large molecules;
digested / broken down (by amylase / enzyme);
to simpler / soluble products / sugars / maltose / (glucose); [max 3]
- (f) (i) starch / cloudiness would eventually disappear / becomes clear;
test-tube **A** enzyme activity would restart / starch digested after;
enzyme merely deactivated at low temperature / owtte; (*reject* frozen) [max 2]
- (ii) starch / cloudiness would continue to be present / starch not digested;
test-tube **E** enzyme activity would not restart;
enzyme denatured / damaged by heat; [max 2]

[Total: 20]

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- 2 (a) column lengths accurate;
labelled;



[2]

- (b) more cigarettes more COHb/proportionality;
up to a point/levelling off;
non smokers do not start at 0/other factors involved;
other sources/named source, of carbon monoxide;

[max 2]

- (c) higher (in both groups);
higher atmospheric CO than UK; (ORA if stated)
CO from traffic/industry/UK population may be rural;
older cars/no catalytic converters;
taken near highway;
no pollution control;
may smoke more cigarettes/be stronger;
AVP;

[max 3]

[Total: 7]

- 3 (a) vectors;

[1]

- (b) (named) bacteria ;
typhoid/cholera/bacterial dysentery/examples;
(accept names of disease-causing organisms or disease only)

[2]

- (c) cover food;
screens (on windows);
electrocuters/sticky strips/insecticides/method of killing; (reject swatting)
cooking – qualified;
AVP;

[max 2]

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- (d) (only) female bites/sucks blood;
she needs protein meal;
before producing eggs;
ORA for males – plant juices only;

[max 1]

[Total: 7]

- 4 (a) fibre;
iron/Fe;
vitamin D;

[max 2]

- (b) calcium/Ca;
vitamin D;
protein;

[max 2]

- (c) iron is a component of haemoglobin;
haemoglobin carries oxygen;
prevents anaemia/less likely to have anaemia;

[max 2]

- (d) promotes peristalsis;
prevents constipation;

[max 1]

[Total: 7]

- 5 (a) (chemical) digestion; (*ignore* protein to amino acids)

[1]

- (b) respiration; (*ignore* oxidation)

[1]

- (c) assimilated;
turned into protein;

[max 1]

- (d) ammonia is toxic;
it is combined with carbon dioxide;
turned into urea;

[max 2]

[Total: 5]

- 6 (a) prevents blood loss/haemorrhage;
prevents entry of pathogens/infections;
scab is protection for new cells underneath;

[max 2]

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(b) slow flow rate;
low blood pressure / pooling of blood;
lower than heart / longer distance to travel;
problems with moving blood against gravity;
people sitting / legs not moved for long periods of time; [max 2]

(c) (leg) muscles contract **less**;
squeeze veins **less**;
resulting in **reduced** blood flow; (*accept* slowly)
AVP; [max 2]

(d) fatty deposits / cholesterol;
poor circulation / AW;
less movement or exercise; [max 2]

(e) heart attack / myocardial infarction;
stroke;
pulmonary embolism;
other likely consequence; [max 1]

[Total: 9]

7 (a) *filtration* **F**;
reabsorption of glucose **G**;
reabsorption of salts **G, H, J**; (max 1, mark first letter only)
reabsorption of urea **G, K**; (max 1, mark first letter only)
reabsorption of water **G, H, J, K**; (max 1, mark first letter only) [max 5]

(b) (i) (tubule) into pct;
active transport / is pumped / cotransported;
against concentration gradient;
using energy / ATP;
from respiration;
(out of tubule / nephron) into blood vessels / capillaries;
down concentration gradient; [max 4]

(ii) by osmosis / diffusion;
along with salts / sugars;
under influence of ADH;
water concentration / potential gradient / AW;
into blood vessels / capillaries; [max 3]

(c) water-soluble / blood soluble substances;
pass into filtrate / are filtered, so pass into urine;
removed / excreted, as sweat / through skin;
may be broken down in liver; [max 3]

[Total: 15]

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- 8 (a) cornea;
lens;
vitreous humour;
fovea / yellow spot;
- (b) light / rays bent / refracted;
(refracted) by cornea;
(refracted) by lens;
light passes through aqueous humour / vitreous;
focused onto retina;
fovea / yellow spot;
image is inverted / upside down ; (*ignore* rods / cones / optic nerve onwards) [max 4]
- (c) *rods*
rod-shaped / blunt tip;
of one type only;
monochrome;
(still sensitive) in low light intensities;
widespread throughout retina;
about twice as many as cones;
absent from fovea;
several connect to one bipolar neuron / ganglion cell / relay cell / nerve fibre;
lower resolution image;
(*reverse argument – do not credit twice*)
cones
cone-shaped / tapered tip;
three types / RGB;
colour / trichromatic;
not so sensitive to low light intensities;
widespread throughout retina;
about half as many as rods;
greater concentration in fovea / fovea is cones only;
each connects to one bipolar neuron / ganglion cell / relay cell / nerve fibre;
higher resolution image; [max 3]
- (d) (electrical / nervous) impulses; (*ignore* messages)
passes along sensory neurone;
passed via synapse / across gap;
chemical / (neuro) transmitter;
diffuses;
to relay neurone / to next cell or neurone;
which recreates (electrochemical) impulse; [max 4]

[Total: 15]

Page 7	Mark Scheme	Syllabus	
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- 9 (a) (antibiotic is) compound / drug; (*ignore* chemical / tablet)
 that kills bacteria;
 inhibits bacterial growth;
 concept of specificity;
 produced by micro-organism / mould / fungus / penicillium;
 may be modified (by Man) / semi-synthetic;
 (antibacterial but) not antiviral; (*ignore* resistance, example)

[max 5]

- (b) (antiseptic is) used on human body / tissue / skin / externally;
 reduce / prevent infection; (*ignore* cure)
 inhibit reproduction of bacteria / bacteriostatic;
 example of antiseptic;
 example of use scenario for antiseptic; e.g. wounds

as opposed to / milder than disinfectants;
 which kill bacteria / are bacteriocidal;
 and damage human tissue;
 use of disinfectants on surfaces;
 example of disinfectant;
 example of use scenario for disinfectant;

[max 5]

- (c) is injected (into patient);
 (antiserum) gives immediate protection;
 immune system too slow producing antibodies;
 bacteria will spread;
 serum contains antibodies;
 passes on passive immunity;
 e.g. antitoxin vs tetanus;
 produced in horse / animal / donor organism (usually not human);
 injected with antigen / tetanus toxoid / toxin;
 does not involve person's own antibodies;
 effect wears off after some time;

[max 5]

[Total: 15]

- 10 (a) *respiration*
 release of energy;
 production of ATP;
 mitochondria;
 aerobic;
 involving oxygen;
 (equation) glucose + oxygen → ;
 carbon dioxide + water;
 anaerobic;
 resulting in production of lactic acid; (*reject* and CO₂)
 less energy / less efficient / less ATP;

[max 5]

Page 8	Mark Scheme	Syllabus	
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- (b) *recycling of carbon* – credit points on diagram
 photosynthesis;
 assimilation / fixation;
 respiration;
 decomposition;
 role of carbon dioxide / CO₂ as input in processes above;
 role of carbon dioxide / CO₂ as output in processes above;
 reference to organic compounds e.g. carbohydrates / fats / proteins;

[max 5]

- (c) *reflex action*
 quick;
 automatic;
 not involving brain / involuntary / without thinking;
 response to a stimulus;
 protection / to avoid damage / example e.g. withdrawal / description of scenario;
 nervous impulse passed from;
 sensory neurone;
 (to) intermediate / relay / connector neurone / motor;
 mention of synapse (between neurones above);
 (to) effector / muscle;

[max 5]

[Total: 15]