CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the May/June 2013 series

5096 HUMAN AND SOCIAL BIOLOGY

5096/23 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.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

Section A

1 (a) (i) correctly labelled with line ending on structure wall or lumen
A – capillary;
B – sweat duct;
C – sweat gland; [3]

(ii) 3; [1]

(b) (i) 5.5 ; [1]

(ii) capillary / blood vessel / arteriole vasodilation; (*reject artery*)
shunt vessels constrict;
more blood flow to the skin surface;
more blood flow to the sweat glands;
sweat glands produce more sweat; [max 2]

(iii) blood carries heat;
heat released, when chemical reactions occur / during respiration;
more heat released during exercise;
heat (energy) used to evaporate water (in sweat);
reference to latent heat of evaporation OWTTE;
body loses heat / is cooled;
reduces body temperature / returns temperature to normal;
homeostasis / maintain constant body temperature;
prevents denaturing of enzymes;
prevents cell death; [max 5]

(c) (i) (the rate of) sweating increases when exercise is taken;
the more weight carried, the higher the rate of sweat production;
a higher environmental temperature increases the rate of sweat production (for all conditions of both clothing and weight carried);
wearing extra clothing increases the rate of sweat production;

(*answers may be given in any order* (*OWTTE throughout*)) [4]

(ii) more muscle contraction (in exercise) releases more heat;
reference to energy 'lost' as heat;
reference to tissue respiration / equation;
more sweat needed to lose more heat; [max

muscles have to contract more strongly to carry extra weight;
more heat released which has to be lost; [2]

it is more difficult to lose body heat if environmental temperature is higher;
less difference between body temperature and that of environment;
more evaporation of sweat required; [max 2]

clothing reduces rate at which sweat can evaporate;
less heat lost;
body produces more sweat; [max 2]

[max 4 for part (c) (ii)]

[Total: 20]

2 fat globules to smaller ones – **D**;
glucose broken down to release energy – **G;**
large molecules to smaller ones by enzymes – **B**;
liver cells using glucose to form glycogen – **A**;
passing fibre out of the body – **C**;

(*do not award a mark if more than one letter written in a box*)

[Total: 5]

3 **(a)** more muscle contraction requires <u>more</u> energy;
(this) requires <u>more</u> oxygen;
oxygen is carried in the blood;
<u>more</u> carbon dioxide must be removed;
faster heart rate pumps <u>more</u> blood to muscles;

(*the word 'more', or a similar word, must be included at least once in the explanation, but need not be mentioned in each marking point*)

[max 3]

(b) **(i)** danger of stressing the heart;
some people will not be capable of the average;
some people might be ill / very unfit;
AVP; [max 2]

(ii) 200;;
(160 × 100/80 **or** 160 × 1.25 for a max 1) [2]

(c) (i) age (of people) / years;
both points correct ± ½ square and line drawn with ruler;

(ii) 103 –105; (within this range) [

(iii) (maximum) heart rate decreases with age;
steady decline / same rate of decline (every 10 years);
use of figures to show decrease; [max 2]

[Total: 12]

4 (a) (i) pupil has become, larger / wider / dilates; [1]

(ii) light intensity has decreased / OWTTE;
(*accept shock* / *fright* / *use of drug*) [1]

(iii) retina detects decrease in light (intensity);
ref to reflex action;
circular muscles in iris have relaxed;
radial muscles in iris have contracted; [max 2]

(b) ciliary muscles contract;
tension taken off suspensory ligaments;
lens becomes thicker / more curved / more convex; [max 2]

[Total: 6]

5 (a) carbon dioxide – more;
oxygen – less;
temperature – higher; [max 3]

(b) increase in breathing rate;
increase in volume of each breath;
increase in the minute volume / AW; [max 2]

[Total: 5]

6 **(a)** water moved into the tube;
by, osmosis / diffusion;
difference in (water / glucose) concentration;
more quickly than;
glucose, diffuses / moves, into the beaker;
ref to size of pores in membrane;
AVP; e.g. ref to water potential

(*ignore answers like 'trying to equalise the concentration' indicating molecular volition*)
[max 4]

(b) osmosis / movement of water follows glucose, into the beaker;
glucose diffuses into the beaker;
(by 30 minutes) equilibrium established / same concentration of glucose solution in tube and beaker; [3]

[Total: 7]

Section B

7 **(a)** nutrition;
respiration;
excretion;
growth;
response to stimuli / OWTTE;
movement;
reproduction;
(in any order) [7]

(b) **(i)** protein;
biological catalyst;
alters / speeds up, rate of reactions in living organisms;
(*ignore breakdown of food*) [max 2]

(ii) t*emperature*:
activity increases as temperature increases;
until an optimum temperature / until around 37°C; (*allow correct specific exceptions*)
activity decreases above the optimum;
denatured / active site destroyed;
denaturing not reversible;
inactive / not destroyed at low temperatures; [max 3]

pH:
optimum pH;
(usually) optimum is, around pH 7 / correct example (e.g. pepsin);
less active above and below optimum;
denatured by extremes of pH;
denaturing not reversible; [max 3]
[max 6]

[Total: 15]

8 **(a)** photosynthesis;
carbon dioxide;
water;
combine to form glucose;
light energy needed;
in presence of chlorophyll;
oxygen released;

(*allow if points made using word or chemical equations*)
[max 4]

(b) mouth / buccal cavity;
salivary glands;
produce amylase;
converts starch to maltose;
amylase denatured by stomach acid / OWTTE;
duodenum;
pancreas; (*reject if incorrect ref, e.g. food goes into the pancreas*)
produces amylase;
converts (remaining) starch to maltose;
ileum;
intestinal glands;
produce maltase;
converts maltose to glucose; [max 9]

(c) diffusion;
active transport; [2]

[Total: 15]

Section C

9 (a) (i) plasma;
red blood cells;
phagocytes;
lymphocytes;
platelets;

(*accept any substances present in plasma to max 4, e.g. glucose, hormones, urea, antibodies, amino acids, etc.)* [max 4]

(ii) plasma transports:
cells / e.g. cells;
absorbed nutrients / example of one;
carbon dioxide;
urea;
hormones;
heat;
AVP; [max 4]

red blood cells:
transports oxygen;
transports carbon dioxide;

white blood cells – defence against disease;
or
phagocytes – ingestion of micro-organisms / AW;
lymphocytes – production of antibodies;
platelets;
clotting of blood; [max 4]

(*accept any suitable comments about substances listed in mark scheme to* **(i)**)

[max 8]

(b) between left atrium and left ventricle;
between right atrium and right ventricle;
(allow 1 mark for between atria and ventricles)

<u>base</u> of aorta; (*reject aorta unqualified*)
<u>base</u> of pulmonary artery; *reject pulmonary artery unqualified*
(at intervals) along veins; [max 3]

[Total: 15]

10 (a) (i) (sugar in food);
fermented / acted on by bacteria;
produce acid;
attacks enamel / dentine; [max

(ii) brush teeth, after meals / before going to bed;
brush gums;
use toothpaste;
use dental floss / tape;
reduce amount of sugar / sweet food in diet;
eat hard / crisp food;
fluoride (in whatever form);
eat foods rich calcium / phosphate / vitamin C / vitamin D;
visit dentist regularly;
AVP; [max 3]

(b) (i) destruction of all organisms present;
example surgical instruments boiled (under pressure) / any valid e.g.; [2]

(ii) both prevent growth of (pathogenic) micro-organisms / AW;
disinfectants are toxic to human tissues; [2]

(c) (i) chemical produced by, living (micro) organisms / fungi;
kill / inhibit, growth of, micro-organisms / bacteria;
example penicillin / any valid example; [3]

(ii) bacteria that are naturally resistant (to that antibiotic) survive;
their offspring inherit resistance property;
antibiotic ineffective in a (serious) infection;
the more antibiotics are used, the more resistant strains will be present;
ref to multiple resistance / resistance to several antibiotics;

(*reject 'develop resistance'*) [max 3]

[Total: 15]