**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**GCE Ordinary Level**

## MARK SCHEME for the May/June 2013 series

# 5096 HUMAN AND SOCIAL BIOLOGY

**5096/22** 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.

**1 (a) (i)** *correctly labelled*
**A** – cortex;
**B** – pelvis; (do not allow extension of area into the top of the ureter)
**C** – ureter; (wall or lumen)
[3]

**(ii)** renal artery;
renal vein; (either order)
artery and vein unqualified = 1 mark only [2]

**(b)** *protein*
large (molecules);
not filtered / (too large) to pass out of, capillary / glomerulus
OR
into filtrate / kidney tubule**;**
accept ref to ultrafiltration

*glucose*
glucose reabsorbed;
by, renal / 1st convoluted, tubule OR by active transport; [4]

**(c) (i)** *cell respiration* – increase;
*exhaled in breath* – increase;
*in sweat* – increase;
*in urine* – decrease;
[4]

**(ii)** *cell respiration*
more energy needed / more muscle contraction (in exercise);
*exhaled in breath*
more, rapid / deeper, breathing (in exercise);
*evaporation in sweat*
rising body temperature in exercise / body needs to be cooled;
*in urine*
idea of water loss (in exhalation and sweating) has to be balanced; [4]

**(d)** anti-diuretic hormone / ADH; [1]
*any two from*:
acts on renal tubule;
alters permeability;
to absorb more water (from filtrate);
[max 3]

**[Total: 20]**

**2** *antibody formation* – **M/H**;
*glucose production* – **F**;
*glycogen formation* - **G**;
*oxygen transport* – **K**;
*phagocytosis* – **M**;
*transformation light energy to nerve impulse* – **E**;
*transport of haploid nucleus* – **L**;

**[Total: 7]**

**3** **(a)** ***A*** pulmonary artery;
***B*** aorta;
***C*** bicuspid valve;

[3]

**(b)** oxygenated blood will pass from aorta to pulmonary artery;
as pressure in aorta is higher;
oxygenated blood sent back to the lungs;
idea of less blood carrying oxygen is sent round the body;
idea of tissues are deprived of oxygen;
heart beats faster to compensate;

allow one mark for **lone** statement that circulation is inefficient;
allow one mark for **lone** statement that oxygenated and deoxygenated blood will mix;

[max 3]

**[Total: 6]**

**4** **(a)** 160 – 169 (mm) to 220 – 229 (mm);
accept 160 – 229 (mm)

[1]

**(b)** **(i)** <u>150</u>;

[1]

**(ii)** 30(%);; 29.7(%) but allow 30(%)
accept ecf from **(b)(i)**

but allow 29.7(%);;
and 45 × 100/150 (or similar);

[2]

**(c)** line at 30 (%) ± ½ square;
accept ecf from **(b)(ii)**
line at 25 (%) ± ½ square;
max 1 if space between bars

[2]

**(d)** *different*:
ages;
sexes;
diets;
genes / race OWTTE;
occupation; e.g. manual work / playing musical instrument;
health;
injury;
AVP;

[max 4]

**[Total: 10]**

**5** **(a)** chemical;
(produced by) endocrine / ductless, gland;
carried in blood;
to target organ OWTTE;

[max 2]

**(b)** **(i)** Y / nervous: more rapid;
lasts for a shorter time;
peak production volume higher;
(or vice versa for Z / hormonal)

[max 2]

**(ii)** stomach is empty of food / nothing present to digest; [1]

**(c)** taste buds stimulated (by food);
(electrical / nerve) impulse;
in sensory neurone;
(transmitted to) relay / intermediate neurone;
(impulse passed along) motor neurone;
glands respond by producing gastric juice;

[max 4]

**(d)** (arrival of impulse at neurone end) release chemical / neurotransmitter;
diffuses;
(across) synapse;
triggers next neurone to transmit an impulse;

[max 3]

**[Total: 12]**

6 **(a)** **R**
**S**
**P**
**N**
**Q**
**T**
5 or 6 correct;;;
3 or 4 correct ;;
1 or 2 correct ;
do not allow if more than one letter is in a box

[3]

**(b)** (blood) clotting prevents entry of organisms;
WBC / phagocytes, ingest organisms that have entered the body;
(lymphocytes) produce antibodies (to immobilise / clump / lyse / produce antitoxins against organisms);

[3]

**(c)** ***cholera***
agent – bacterium / vibrio;
spread – drinking water contaminated with feces / eating food contaminated by flies that have fed on feces or eating food prepared by healthy carriers;
control – disposal of feces in sanitary way / boil drinking water / chlorinate drinking water / kill flies / hygienic food preparation / isolate sufferers / treat contacts with antibiotics / trace and treat carriers / vaccination;

***influenza***
agent – virus;
spread – droplet infection in the air;
control – good ventilation of rooms / avoid crowds / use of handkerchiefs / use vaccine;

***tuberculosis***
organism – bacterium / *Mycobacterium tuberculosis*;
spread – droplet infection from coughing or spitting / spores that survive drying / eating food containing spores / drinking infected milk;
control – isolation of those infected / better standard of housing and better nutrition / do not spit / cough without using handkerchief / tuberculosis testing cattle / mass X-ray screening / (BCG) vaccinations;

[9]

**[Total: 15]**

7 **(a)** ventilation of lung surface / inhaling and exhaling; ignore $O_2$ in and $CO_2$ out
energy release in cells (from glucose) / allow word or chemical equation;

**(b)** external intercostals muscles contract;
internal intercostals muscles relax;
rib cage moves up and out;
(muscle of) diaphragm contracts;
diaphragm lowers;
volume of thorax is increased;
pressure inside thorax, decreases / falls below atmospheric pressure;
air is forced into the lungs;

[max 6]

**(c)** **(i)** cells lining respiratory tract produce mucus;
(sticky) mucus traps micro-organisms / bacteria and dirt particles;
cilia sweep dirty mucus / dust away from lungs;

[3]

**(ii)** cilia stop sweeping / become paralysed;
more mucus produced;
AVP

[max 1]

**(iii)** mucus drains into the lungs;
less, SA for / efficient, gas exchange;
coughing to remove mucus;
idea of repeated coughing damages alveoli;
bacteria / micro-organisms reach the lungs;
cause lung infections;

*any two from*
lung cancer;
bronchitis;
emphysema;
asthma;
reject heart disease

[max 3]

**[Total: 15]**

**8** **(a)** (nitrate ions in soil)
uptake by green plants;
present in plant protein;
plants eaten by animals;
present in animal protein;
broken down into urea;
released in urine;
protein in dead animal or urea in urine;
broken down by bacteria;
nitrate ions returned to soil;
nitrogen fixing bacteria;
convert atmospheric nitrogen into nitrates;
AVP;; (e.g. reference to lightning / root nodules)
reject Haber process

[max 8]

**(b)** eutrophication;

fertiliser / named ions, in water:

aquatic plants grow very rapidly;
nitrates used in plant protein;
can cause algal bloom;
which restricts light reaching plants below surface;
some algae poisonous to animals in their drinking water;
(at night) plants (only) respire;
produce large quantities of carbon dioxide;
dissolves in water to form acid;
kills many organisms (e.g. fish);
bacteria decay dead, plants / algae;
BOD increases / oxygen concentration decreases;

[max 7]

**[Total: 15]**

**9** **(a)** **(i)** carbohydrates;
protein;
fat / lipid; (any order)

[

**(ii)** *carbohydrate:*
energy source;
storage as glycogen;
source of fibre / prevents constipation;
accept growth / repair of cells;

[max 2]

*protein:*
growth;
repair / replacement;
component of membrane(s);
component of e.g. haemoglobin / insulin / enzymes/hormones;
component of cytoplasm;
(secondary) energy source;

[max 2]

*fat / lipid:*
cell membranes;
energy source;
storage material;
solvent for vitamins A and D;
protection of, organs / eyes / kidneys;
insulation;
AVP; e.g. waterproofing

[max 2]

[max 6]

**(b)** **(i)** (named) vitamins;
(named) minerals; (any order)

[2]

**(ii)** *accept any correct*

vitamin C – healing of wounds AW;
**or** vitamin D – absorption of calcium from alimentary canal;

iron – formation of haemoglobin;
**or** calcium – formation of teeth / bones / blood clotting / muscle contraction;

[2]

**(c)** *any two from*
hydrolysis of foods in digestion;
solvent;
transport medium;
component of body fluids;
component of cytoplasm;
temperature control;

tears for cleaning front of eye;
hydrostatic skeleton in the eye;
supportive role of amniotic fluid;

[max

**[Total: 15]**