

CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

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MARK SCHEME for the October/November 2012 series

5096 HUMAN AND SOCIAL BIOLOGY

5096/22

Paper 2 (Theory), maximum raw mark 100

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Section A

- 1 (a) A renal artery;
 B renal vein;
 C ureter; [3]
- (b) section / cut / sliced through;
 lengthways / from top to bottom / along long axis;
 to show internal structure / specific (named) kidney structures in Fig 1.1; [max 2]
- (c) (i) they / plasma proteins / molecules, too large, to pass out / were filtered out; [1]
- (ii) (selectively) reabsorbed;
 into the blood stream;
 glucose is needed, by the body for respiration / useful substance; [max 2]
- (iii) blood sodium chloride is held constant by homeostasis;
 body (cells) needs blood of constant osmolarity / isotonicity / water potential / solute potential / 'water concentration' / 'solute concentration';
(ignore concentration alone)
 excess is excreted / passed out by kidneys / removed in urine;
 depends on dietary input / meal / food eaten;
 amount of water may vary; [max 3]
- (iv) depends on dietary input / activity;
 level controlled / homeostasis / negative feedback;
 pancreas detects / monitors blood glucose concentration;
 (reference to action of) pancreatic hormone / insulin / glucagon;
 and liver;
 surplus glucose must / should be stored as glycogen; [max 3]
- (v) more protein eaten;
 more amino acids deaminated / broken down in liver; [max 1]
- (d) (i) it / membrane is selectively permeable / AW;
 provides large surface area / maximise filtration;
 for urea / excess salts;
 to cross / diffuse through; [max 2]
- (ii) prevent (glucose) loss (from body);
 equilibrium with / equal concentration to plasma / blood;
(accept prevents concentration gradient reject supply to patient) [max 2]
- (iii) keep concentration gradient high / maintain correct concentration /
 concentration gradient maintained;
 remove / flush out waste / urea; [max 1]

[Total: 20]

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- 2 (a) (muscular) contractions of uterus;
dilation / cervix dilates; (*accept* waters break);
AVP × 2 e.g. abdominal / genital area pain / discomfort;
(*ignore* dates / induction) [max 1]
- (b) waters break / amnion membrane breaks / releases amniotic fluid;
dilation / cervix dilates;
baby's head turns / head comes out; (*ignore* reference to body) [max 2]
- (c) placenta detaches / delivery of afterbirth / placenta;
(*accept* tying / cutting umbilical cord); [max 1]
- [Total: 5]**
- 3 (a) genetically identical *all three of: D + F + G;* [max 1]
genetically different *three from: H + J + K + L + E + only one of D / F / G;* [max 1]
- (b) location AVP e.g. skin / somatic cells gonads / ovary / testes;
/ bone marrow; (*ignore* reproductive organs)
- role growth / repair / AW; gamete / sperm / ovum;
production;
- number diploid / 46; haploid / 23; [max 6]
- [Total: 8]**
- 4 (a) (blood vessels) near / in tissues / cells / body / *accept* (named) organ or part specified; [1]
- (b) CO prevents O₂ uptake;
monopolises Hb;
less free Hb;
where oxygen concentration low / AW; [max 1]
- (c) (heart muscle) must work harder / pump faster / higher blood pressure;
(to pump) same amount of O₂ / provide tissue / cells with sufficient oxygen;
OR idea that not enough oxygen getting to heart muscle / tissues; [max 2]
- (d) cigarette smoking;
car exhausts / fossil fuels / industry;
heating / cooking;
incomplete combustion; [max 1]
- [Total: 5]**

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- 5 (a) **M** arteriole / artery;
N capillary;
P venule / vein;
- (b) increased blood flow;
near surface;
through capillaries(/**N**); (superficial capillaries award 2 marks) (*reject* capillaries move)
vasodilation;
arterioles(/**M**) dilate/widen/muscle in walls relax; (*reject* capillaries become wider)
heat lost by radiation / conduction / convection;
less blood through shunt / shunt vessels constrict; (*reject* sweating etc) [max 4]
- [Total: 7]
- 6 (a) hormones are sent via blood;
can pass to all parts of body;
affect more than one target organ;
impulse passes down axon / neurone; (*ignore* nerves)
only forms synapse with cells at end of axon / smaller target area / only glands and effectors / localised;
nerves do not reach every part; [max 4]
- (b) hormones continue to circulate;
until excreted / broken down / diluted;
nervous effect stops once impulse arrives; [max 2]
- [Total: 6]

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- 7 (a) any reasonable suggestion e.g.
 easily contactable via medical authorities;
 describe smoking accurately;
 mortality easy to follow;
 cause of death accurate;
 record keeping / reporting;
 open to scientific principles;
 easy to trace / AW; [max 1]
- (b) (81-58) **23**; [1]
- (c) smoking causes early death / ORA;
 cancer / lung cancer smoking related diseases;
 heart problems; [max 2]
- [Total: 4]**

Section B

- 8 (a) **R** trachea / windpipe; (*accept* cartilage once only - see **W**)
S lungs;
T rib / ribcage;
U diaphragm;
W bronchus / fibrous tissue / cartilage; [5]
- (b) external intercostal muscles contract;
 internal intercostals relax;
 ribs move upwards;
 ribs move outwards;
 diaphragm contracted;
 less curved / flatter / moves downwards / AW; [max 5]
- (c) (i) more / higher % / comparative statement;
 (relating to) CO₂; [2]
- (ii) to ensure same gas flows through tubes 1 & 2 / both tubes / equal
 volumes of inspired and expired air / valid comparison / AW; [1]
- (iii) of CO₂ in atmospheric air;
 some / small amount / 0.03% / 0.04% or quantitative comparison with
 exhaled air e.g. 1 / 100th; [2]
- [Total: 15]**

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9 (a) (i) *roots*
nitrate;
in solution;
active uptake;
by root hairs;
symbiotic;
nitrogen fixation / nitrogen fixing bacteria;
nodules;
(atmospheric) nitrogen /AW;
(see also last 3 points below) [max 5]

(ii) *leaves*
carry out photosynthesis;
accept reference to plant as (primary) producer;
produce carbohydrate / sugars;
fix CO₂ / from carbon dioxide (and water); (2 marks above available in equation form)
using light energy;
using chlorophyll / chloroplasts;

(points below may be in upper section - credit once only)
carbohydrate / CHO combined with N / nitrates;
to make amino acids;
amino acids polymerised (into proteins); [max 5]

(b) (explain the parts carbohydrates play in human nutrition)
(named) sugars ;
starch;
(easily) digestible;
energy source;
energy storage;
glycogen;
indigestible;
cellulose / fibre / roughage;
convert to fat;
make nucleic acids;
AVP; e.g. (cellulose fibre) prevents constipation [max 5]

[Total: 15]

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Section C

10 (a) euphoria/well being/high/(CNS) depressant (relieving tension/anxiety);
alert/drowsy (alternating) / narcosis;
mouth dry/skin flushed/pupils reduced;
breathing slower/muscles weaker/less desire for food/drink/sex;
pain killer;

addiction/dependence;
tolerance/greater amounts required;
heart/circulatory problems/pulse drops/BP drops/blood clot;
liver damage;
abscesses;
constipation;
(*ignore* withdrawal)

[max 6]

(b) addiction/physical dependence;
progression: sniffing/smoking to injecting/mainlining;
non sterile syringes/needles;
risk of infections;
HIV/hepatitis/fungal;
adulterants/contaminants/cutting agents;
poisoning/effects described e.g. allergy;
(heroin taking) becomes main activity/other activities e.g. work secondary/loose job;

kidney problems;
nasal effects (broken, dilated blood vessels) if sniffed;

uncertain purity/strength;
may lead to overdose;

contact with pushers/criminals;
financial difficulties;
leading to criminal activity/fights/stealing;
family breakdown;

[max 6]

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- (c) used as painkiller / analgesic / not recreational;
only on prescription / following medical examination / from pharmacy;
purified / reputable manufacturers only;
defined / restricted quantity;
single use needles / needle exchange programs; also syringes
treatment "tapered" to avoid dependence;
or restricted to terminal conditions;

registered addict programme;
medicines to reduce addiction / substitutes e.g. methadone;
(theoretically) less addictive / habit-forming;
accept reference to cold turkey withdrawal symptoms (sickness, sweating,
muscle pains, hallucinations);

[max 3]

[Total: 15]

11 (a) *days 0 – 40*

primary response;
artificial immunity;
active immunity;

lag before / day 0 – 6 / slowly / takes time;
(eventual / day 7 – 16) increase in antibody concentration / titre;
gradual decrease in antibodies;
but not down to zero / some antibodies remain in blood;
(vaccine contains) antigen on / from surface of pathogen ;
weakened / attenuated strain;
detected by wbc;
antibody produced;
by lymphocytes / B cells;
memory cells produced;

day 40 onwards

secondary response;
no lag / immediate / quicker response ;
higher levels of antibodies;

memory cells recognise / respond;
same antigen in pathogen *accept* reference to booster;
causes antigen-antibody reaction;
memory cells divide;
to make more lymphocytes / B cells;
antibody attaches to antigen;
neutralises it / targeted by phagocytes;
causing immunity;

[max 12]

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(b) see diagram below

lag;
rise; (but below half of full height)
fall but not to touch x-axis;

[3]

[Total: 15]

