

MARK SCHEME for the October/November 2013 series

5096 HUMAN AND SOCIAL BIOLOGY

5096/22

Paper 2, 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) [A]oesophagus/gullet;
[B]duodenum/small intestine; [2]

(b) Max 3 from:

contract and;
mix food;
and gastric / digestive juices / (named) enzymes / HCl;

I Squeeze

(mechanical) break down food / increase surface area;

moving food along / emptying;
peristalsis;

sphincters;
control the entry and exit (to and from the stomach);

[max 3]

(c) (i) Max 1 from:

to keep the volumes the same / AW;
control;

R for a fair test

[max 1]

(ii) Max 5 from:

protein / egg white has been, digested / broken down;
(converted) into, (poly)peptides / amino acids;
which are soluble;

(caused) an enzyme / protease / pepsin;

acid / lower pH (as environmental factor);

I acid acting alone

warmth / 37 °C / body temperature;

AVP e.g. ref to optimum temps or pH;

[max 5]

(iii) test tube 2 – (does not work if pH is) not acid;

A needs acidity

test tube 3 – no enzyme / protease / pepsin ;

A needs enzyme

test tube 4 – no acid and no enzyme / protease / pepsin ;

A needs enzyme and acid / both[max 3]

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(iv) Max 4 from:

measure pH/use pH papers/use pH meter;
ref. to changing pH / range of pH / use alkali / using buffers;

record time to clear ;
description of how to judge endpoint ;

vary temperature;
method of achieving different temperatures ;

use different concentrations of enzyme; **A** amount

different protein (substrate);

AVP;

Ignore more accurate (volume) measurements / repeats [max 4]

(d) Max 2 from:

pancreas;
liver;
(wall of) small intestine / duodenum ;

R gall bladder

[max 2]

[Total: 20]

2 (a) Max 3 from:

at certain places on the retina there are no light sensitive cells A/W ;

(the eye has) blind spot;

I optic nerve

not the same side for each eye A/W ;

the image falls on the blind spot at a certain distance only A/W ; [max 3]

(b) Max 3 from:

wide(r) field of vision;
each eye covers the other's blind spot;
useful for judging distance;
perception of depth / AW;
useful for judging speeds;
stereoscopic vision;
not complete blindness due to loss of one eye AW ;

[max 3]

[Total: 6]

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3 (a) 41% + 68% **Need both correct for the mark.** [1]

(b) no mark for choice of meal –B

max 2 from:

because it has 68% / >50% from carbohydrates;
fats within range;
A has too much fat ;

[max 2]

(c) (i) not digested / not absorbed / egested ; **I not used / excreted** [1]

(ii) **max 2 from:**

any (named) vitamin or (named) mineral or water ; ;

[2]

[Total: 6]

4 (a) **max 2 from:**

diffusion;
from high to low concentration / down concentration gradient;
via tissue fluid;
through muscle cell membrane;
AVP;

[max 2]

(b) max 2 if any symbols used (e.g. mixture of words and symbols)
ignore any symbols if all the words are given

[glucose] + oxygen; → carbon dioxide; + water;
 or water; + carbon dioxide;

[max 3]

[Total: 5]

5 (a) C cell wall
D cell membrane
E cytoplasm
F nucleus

[4]

(b) **max 3 from:**

osmosis;
diffusion / movement, of water ;
out of, cell / cytoplasm / down water concentration AW / potential gradient;
through partially permeable (cell) membrane; **A semi-permeable**
plasmolysis / cell shrinkage;

[max 3]

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(c) max 3 from:

sugar solution more concentrated;
 water passed out of cytoplasm/cell;
 plasmolysis/cell shrinkage;
 cell membrane detached from cell wall ;
 cytoplasm volume reduced;
 vacuole, reduced/non existent;

R vacuole bursts

[max 3]

[Total: 10]

(6) max 8 from:

stage 1

(tip head back) to open airways;
idea of making sure that the tongue is not obstructing flow of air ;
idea of making sure that debris is not obstructing the flow of air ;

stage 2

(pinching nose) idea of ensuring air goes down windpipe / stop air coming out of nose ;

stage 3

(blowing air) increasing pressure so air enters the lungs;
idea that oxygen is in expired air ;
 air / oxygen enters, lungs / alveoli;
 hand on chest to check that air is entering A/W;

stage 4

(removing mouth) person can exhale;
 weight of rib cage causes exhalation;
 removal of carbon dioxide;
 hand on chest to check that air is leaving A/W;

max 8

[Total: 8]

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Section B

* allow once only

7 (a) (i) brain and nervous system

max 7 from:

(short-term :)

idea of light headed / euphoria;

neurone damage / effects on neurone membranes; **I ordinary cells**

idea of longer reaction time / slower decisions / impulses slower / impaired judgement ;

link to passage of impulse / synapses;

loss of consciousness;

loss of coordination / muscular control / slurred speech;

rationality altered / mood changes (happy, sad, angry, confused, sexy, sleepy, aggressive);

memory loss;

dehydration / diuretic effect;

hangover / description (headache / sickness / upset stomach / dizziness);

AVP;

(long-term:)

brain shrinkage;

blood vessels (possibly) leaky stroke;

sleep patterns altered;

addiction ;

AVP;

[max 7]

(ii) liver

max 4 from:

removes / converts alcohol (from blood);

(limited) removal rate of one unit per hour ;

(breakdown makes) toxic products / acetaldehyde / ethanal;

fatty deposits / fatty liver ;

cirrhosis;

(alcoholic) hepatitis;

liver cancer;

AVP;

[max 4]

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(b) alcohol and baby in utero
max 4 from:

reference to maternal and fetal blood;
through placenta;
idea that placenta is not a barrier for alcohol;

reduced birth-weight / reduced growth;
possible miscarriage;

reduced, IQ / intellectual ability / brain development / head size;
behaviour problems/ learning difficulties;
modified facial features or described;

fetal alcohol syndrome;

AVP;

[max 4]

[Total: 15]

8 (a) max 5 from:

Red blood cells - transport oxygen;

- transport carbon dioxide;

White blood cells - defence, against / 'fight', infections or pathogen;

ref. to phagocytes / phagocytosis / description;

lymphocytes produce antibodies ;

- (antibodies) counteract antigens ;

AVP ; e.g. produce antitoxins

[max 5]

(b) max 5 from:

cause blood clotting;

fibrinogen fibrin;

soluble to insoluble (threads);

fibres trap (red) blood cells;

forms, clot / scab ;

prevents, blood loss / haemorrhage;

prevents, infection / entry of pathogens;

AVP; e.g. ref. of calcium ions / vitamin K

[max 5]

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(c) max 5 from:

- transport of, cells / platelets;
- transport of (one named) digestion products;
- transport of carbon dioxide / bicarbonates ; **I oxygen**
- transport of water;
- transport of urea;
- transport of (one named) hormones;
- transport of heat;
- ref to plasma proteins e.g. fibrinogen, albumin, antibodies;
- ref to tissue fluid formation;

ref to tissue fluid reabsorption;
AVP;

[max 5]

[Total: 15]

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Section C

9 (a) max 3 from:

(both) living ;
 tissues ;
 composed of cells ;
 and (non-living) matrix ;
 tough / AW;
 give shape to arm;
 AVP;

[max 3]

(b) max 8 from:

bone:

collagen;
 fibres;
 forms shape of bones;
 calcium phosphate/calcium salts/mineral salts; **I calcium alone**

hard / rigid / non-elastic;
 as reinforcement;
 act as levers;
 for protection;
 ref. to making red / white blood cells ;
 fat storage ;

[max 6]

cartilage:

(more) flexible / softer;
 water-filled matrix; **I soft / elastic**
 forms covering, at ends of bones / in joints;

cushion like / absorbs shock / load-spreading;
 reduces friction;

[max 8]

(c) max 4 from:

tendons:

(white) collagen;
 inelastic; **A non-elastic**
 attach muscles to bones;

ligaments:

(yellow) elastin;
 elastic;
 attach bone to bone;

[max 4]

[Total: 15]

* allow once only

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10 (a) max 5 from:

contract;
 biceps / triceps / other muscles;
 antagonistic action ;
 origin / point of attachment fixed;
 insertion / (other end) moves when muscle under tension;
 named bone moved by a named muscle ;

bones act as levers;
 flexion / extension (straighten) / rotation;
 energy from respiration;

[max 5]

(b) (i) max 5 from:

voluntary / conscious / thought involved / not automatic ;
 (action) initiated in brain / cerebrum;
 impulses passed;
 synapse / synaptic transmission / detail explained;*

I messages/signals

to other side of body / via motor area;
 down spinal cord;
 to intermediate / relay neurone;
 to motor neurone;

to muscle / effector;
 e.g. biceps/triceps;

another impulse;
 to antagonistic muscle/other named;
 repeated;
 AVP ; out at root / part of spinal nerve/peripheral ns

[max 5]

(ii) max 5 from:

reflex / no thought involved / automatic / involuntary / not under conscious control ;

receptor detects the heat stimulus;
 impulse passed along sensory neurone;
 (spinal) nerve ;
 to spinal cord;
 to intermediate / relay neurone;
 synapse / synaptic transmission / detail explained;*
 to motor neurone;
 to muscle / effector / biceps;
 quick(er);
 single action / once only;

[max 5]

[Total: 15]