

**MARK SCHEME for the May/June 2011 question paper
for the guidance of teachers**

5096 HUMAN AND SOCIAL BIOLOGY

5096/23

Paper 2 (Theory), maximum raw mark 100

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Page 2	Mark Scheme: Teachers' version	Syllabus
	GCE O LEVEL – May/June 2011	5096

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- 1 (a) (i) correctly labelled
A aorta;
P pulmonary vein;
R right ventricle;
V vena cava; [4]
(label line to end on wall or lumen, reject if left ventricle labelled)
- (ii) muscle / cardiac muscle; [1]
- (iii) sends electrical impulses through the heart wall;
which makes the heart / muscle contract regularly;
(stimulates (heart) muscle to contract = 1 mark) [2]
- (iv) atrio-ventricular / mitral / bicuspid valve;
prevents backflow of blood / prevents blood flowing into atrium;
(accept left or right a-v valve) [2]
- (v) aortic valve / semilunar valve / pocket valve; [1]
- (vi) in the veins; [1]
(accept in the lymphatic vessels, ignore at the base of pulmonary artery)
- (b) (i) blood clot / thrombus; [1]
(accept plug of cholesterol / fat)
- (ii) heart muscle cells deprived of blood / oxygen / glucose;
cells die as they lack of energy; AW [2]
- (iii) reduced contraction of (left) ventricle;
pumping action of the heart less efficient / ceases; [2]
- (c) inherited disposition; AW
(high) blood pressure;
(high) levels of stress;
lack of exercise;
high level of animal / saturated fats in the diet;
high levels of blood cholesterol;
smoking; [max 4]

[Total: 20]

- 2 nose influenza
tuberculosis (TB)
- mouth cholera
typhoid
tuberculosis (TB)
(accept) schistosomiasis/bilharzias
(any 2 correct for 1 mark)
- reproductive system HIV infection
gonorrhoea
- skin ringworm
schistosomiasis/bilharzia
- [max 4]
- [Total: 4]

- 3 (a) A axes labelled;
P correct plotting;
B bars drawn neatly and not touching;
L bars identified; bars same width [4]
- (b) the risk of early death is increased if (men) smoke;
the younger (men) are when they started to smoke, the more likely they are to die early;
the more cigarettes smoked per day, the higher the risk of early death; [3]
- [Total: 7]

- 4 (a) (i) label to the
P cervix;
Q ovary;
(label lines to end on the structure) [2]
- (ii) chromosome numbers inserted
muscle cell of uterus = 46 and cell of uterus lining = 46;
ovum = 23 and sperm = 23;
zygote = 46; [3]
- (iii) mitosis; [1]
- (b) (i) dominant; [1]
- (ii) individuals 6 + 7 both affected/have polydactyly;
but individual 11 is normal thus condition must be dominant;
and received a recessive allele from both parents; AW [3]
(accept 11 could not occur if condition were recessive)
- [Total: 10]

Page 4	Mark Scheme: Teachers' version	Syllabus
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- 5 (a) (i) chemical/protein made by lymphocyte;
in response to presence of antigen;
reference to specificity; [m] [2]
- (ii) antibodies gradually destroyed/excreted by body of person R;
person R's lymphocytes are not producing any more; AW [2]
- (iii) lymphocytes of person S take time to sense antigen /AW;
and produce specific antibody required /AW; [2]

- (b) passive;
natural; [2]

[Total: 8]

- 6 (a) total water loss = 2500 cm³ per day;
% lost as sweat = $100 \times 500 / 2500 = 20\%$; [2]

- (b) volume of water lost as sweat will increase;
needed to cool the body; [2]

- (c) evaporation of water from lung/alveolar surface; AW
expired air contains water vapour; AW [2]

[Total: 6]

Page 5	Mark Scheme: Teachers' version	Syllabus
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- 7 (a) **carbohydrate** energy source;
energy store / glycogen;
fibre / roughage / prevent constipation;
synthesis of nucleic acids / ATP / NAD; [max 1]
- fat** cell membrane constituent;
energy source;
energy store;
heat insulation;
solvent for vitamins / A / D / E / K; [max 2]
- protein** growth;
repair;
replacement;
constituent of cytoplasm;
cell membranes;
energy source;
haemoglobin / myoglobin;
enzymes / insulin / glucagon;
chromosomes;
collagen / elastin / keratin;
antibodies;
actin / myosin; [max 2]

(b) **rich source of calcium**

named dairy produce / beans / oily fish / carrots / hard water / AVP;

use in body

constituent of bones / teeth;
needed for muscle contraction / at neuro-muscular junction;
needed for nerve impulse / transmission across synapse;
needed for blood clotting;
increases beating of sperm tail;
promotes acrosome reaction; [max 4]

(c) do not damage / bruise fruit;

wash food before cutting up;
scrub root vegetables or peel very thinly;
do not chop fruit into small pieces;
do not soak before cooking;
do not use cooking soda;
cook rice in just enough water so that all is absorbed;
cook in small amount of water;
use water from cooking to make e.g. sauces / gravy / soup;
put food into boiling water;
cook for as short a time as possible;
cook with lid on pan;
cook food as soon as possible;
eat cooked food as soon as possible;
do not fry food; [max 5]
(AW throughout)

[Total: 15]

Page 6	Mark Scheme: Teachers' version	Syllabus
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8 (a) impulse; (credit once only)

sensory neurone

transmission from sense organ/receptor;
to (neurone in) brain/spinal cord/CNS;
(if message/signal is used, penalise once only)

intermediate/relay neurone

transmission (of impulse) from sensory neurone;
to motor neurone;
within brain/spinal cord/CNS;

motor neurone

transmission (of impulse) from neurone in brain/spinal cord/CNS;
to effector organ/muscle/gland;

[max 6]

(b) gap is called synapse;
when impulse reaches the end of one neurone;
triggers release of chemical transmitter/neuro-transmitter/named example;
this diffuses across gap/synapse/to next neurone;
which is stimulated to generate an impulse;

[max 3]

(c) (i) **short term effects of drinking alcohol**

slows down speed at which nerve impulses travel;
reaction times increase;
reduces/impairs co-ordination;
reduces ability to think rationally;
reduces sensation of pain;
loss of inhibitions;
dilation of superficial blood vessels;
lowers blood pressure
increases heart rate;
vision blurred;
speech slurred;
aggression increases;
urine production increases;
intestinal/gastric upsets;
(AW throughout)

[max 4]

(ii) **long-term effects of drinking alcohol**

brain

mental health problems;
memory loss;
dementia;

[max 1]

liver

damage/cirrhosis/formation of fibrous tissue;
impaired liver functions;

[max 1]

[Total: 15]

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- 9 (a) **pancreas**
produces (enzyme) protease/trypsin;
converts proteins to polypeptides/peptides;
produces (enzyme) lipase;
converts fats to glycerol and fatty acids;
produces (enzyme) amylase;
converts starch to maltose;
secretions are alkaline to neutralise stomach acid;

liver

- produces bile;
emulsifies fats/increases surface area;
speeds up fat digestion;
bile is alkaline to neutralise stomach acid;

[max 7]

(b) **pancreas**

- Islets of Langerhans;
detect high glucose level (in blood);
secretes hormone insulin;
stimulates liver cells; *
to convert glucose to glycogen; *
blood glucose level is lowered/returns to normal;
detects low glucose level (in blood);
secretes hormone glucagon;
stimulates liver cells; * (if not given in section on insulin)
to convert glycogen to glucose; *
blood glucose level is raised/returns to normal;

[max 4]

(c) **liver**

- conversion of excess glucose to fats;
deamination;
of excess amino acids;
to produce chemical used as energy source;
and urea/excretory product;
storage of/vitamins /vit. A, /vit. D, /vit. K/it. B₁₂;
storage of iron;
AVP;
allow for glucose/glycogen conversions if not given under pancreas;

[max 4]

the marking points with an asterisk (*) to be credited once only in **either** section
(b) or (c)

[Total: 15]

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10 (a) fat digestion

food chewed in the mouth to increase surface area; *
speeds up enzyme activity; *
churning in stomach increases surface area even more; *
in duodenum;
bile added (from liver);
emulsifies/increases surface area (of fats);
pancreatic secretion;
contain lipase;
converts fats to glycerol and fatty acids;
bile/pancreatic secretions alkaline to neutralise stomach acid; *
pancreatic lipase continues to act throughout ileum;
AVP;

[max 5]

(b) protein digestion

food chewed in mouth to increase surface area; *
speeds up enzyme activity; *
stomach produces protease/pepsin;
reference to acidic optimum pH;
proteins converted to polypeptides; AW
churning in stomach to mix contents/increase surface area; *
pancreatic secretion contains protease/trypsin;
converts polypeptides to peptides; AW
bile/pancreatic secretions alkaline to neutralise stomach acid; *
optimum pH for pancreatic enzymes is (slightly) alkaline; *
ileum produces protease/peptidase; AW
converts (peptides) to amino acids;
AVP;

[max 5]

the marking points with an asterisk (*) to be credited once only in section **(a)** or **(b)**

(c) absorption of products

absorption in the ileum;
folds in the wall increase surface area (for absorption);
villi increase surface area (for absorption);
reference to micro-villi;
amino acids absorbed into blood capillaries in villi;
glycerol and fatty acids absorbed into lacteal in villi;
by diffusion;
by active transport;
AVP;

[max 5]

[Total: 15]