

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
GCE Ordinary Level

**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

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.

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| Page 2 | Mark Scheme: Teachers' version | Syllabus |
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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; [2]  
(stimulates (heart) muscle to contract = 1 mark)
- (iv) atrio-ventricular / mitral / bicuspid valve;  
prevents backflow of blood / prevents blood flowing into atrium; [2]  
(accept left or right a-v valve)
- (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]

|               |                                       |                 |
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- |          |                            |                                                                                                                |
|----------|----------------------------|----------------------------------------------------------------------------------------------------------------|
| <b>2</b> | <b>nose</b>                | influenza<br>tuberculosis (TB)                                                                                 |
|          | <b>mouth</b>               | cholera<br>typhoid<br>tuberculosis (TB)<br>(accept) schistosomiasis / bilharzias<br>(any 2 correct for 1 mark) |
|          | <b>reproductive system</b> | HIV infection<br>gonorrhoea                                                                                    |
|          | <b>skin</b>                | ringworm<br>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;

**[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;

- (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]**

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- 5 (a) (i) chemical/protein made by lymphocyte;  
in response to presence of antigen;  
reference to specificity; [m]
- (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 =  $2500 \text{ cm}^3$  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]

|        |                                |          |
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- 7 (a) **carbohydrate** energy source;  
energy store / glycogen;  
fibre / roughage / prevent constipation;  
synthesis of nucleic acids / ATP / NAD; [max 2]
- 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]

|        |                                |          |
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| 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. B<sub>12</sub>;  
 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]**