

**MARK SCHEME for the October/November 2011 question paper  
for the guidance of teachers**

**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 must be read in conjunction with the question papers and the report on the examination.

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

**Section A**

- 1 (a) **A** hepatic artery;  
**B** (hepatic) portal vein;  
**C** hepatic vein; [3]
- (b) **A:** oxygen;  
hormones / examples;  
(ignore glucose / products of digestion)
- B:** glucose / amino acids / products of digestion;  
alcohol / toxins / drugs;  
vitamins / minerals / water;  
hormones / examples; [max 2]
- (c) thin / thinner (than slide);  
provides flat surface;  
stops specimen drying up;  
protects the high power lens / makes it possible to use high power lens; [max 2]
- (d) **D** cell / surface membrane;  
**E** nucleus; [2]
- (e) (aerobic) respiration; [1]
- (f) **F** gall bladder;  
**G** pancreas;  
**H** bile duct; [3]
- (g) bile;  
made in liver;  
stored in gall bladder;  
emulsification;  
increasing surface area;  
lipase;  
from pancreas;  
making fatty acids + glycerol; [max 4]
- (h) **J** insulin;  
**K** glucagon;  
**L** glycogen; [3]

**[Total: 20]**

Page 3	Mark Scheme: Teachers' version	Syllabus
	GCE O LEVEL – October/November 2011	5096

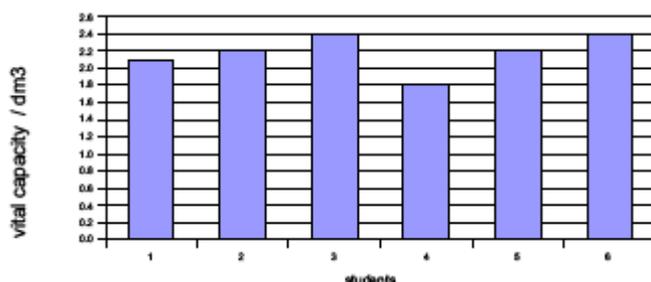
- 2 (a) (i) (increased) light;  
(ii) reflex;  
(iii) prevents damage to retina/ensures correct amount of light enters eye/fast response; [3]
- (b) focusing / accommodation;  
(circular muscles) contract; (or reverse argument)  
slacken suspensory ligaments;  
allow lens to bulge / become fatter;  
for close vision; [max 2]
- (c) peristalsis;  
contract to reduce the diameter;  
so push 'food' / bolus along;  
sphincter muscles contract to stop;  
relax to allow flow; [max 2]
- [Total: 7]
- 3 (a) more sweating / sweat glands more active;  
to cool body / maintain constant body temperature; (ignore heat)  
by evaporation;  
of water;  
ref. to specific latent heat; [max 3]
- (b) cholera toxin damages lining of small intestine;  
causing diarrhoea / watery faeces;  
loss of fluid from gut / water not reabsorbed in colon; [max 2]
- (c) kidneys / (2nd convoluted) tubule / collecting ducts;  
so do not reabsorb water / permeability not increased;  
water does not pass back into, blood / body; [max 2]
- [Total: 7]

<b>Page 4</b>	<b>Mark Scheme: Teachers' version</b>	<b>Syllabus</b>
	<b>GCE O LEVEL – October/November 2011</b>	<b>5096</b>

- 4 (a) lives on/in host;  
lives/benefits at expense of host;  
host not killed;  
ref to blood vessels of gut; [max 1]
- (b) secondary/intermediate host; [1]
- (c) M sexual; [2]  
N asexual;
- (d) cercaria penetrate skin/infect humans/dispersal;  
adult flukes lay eggs/feed in (gut) blood vessels; [2]
- [Total: 7]**

- 5 (a) osmosis/diffusion of water/loss of water; [1]
- (b) (Q) is more concentrated solution/hypertonic/lower water potential/AW;  
tubing is flaccid/(internal) volume has reduced;  
water has moved out;  
movement from higher to lower water concentration/down concentration  
gradient; (accept water potential) [max 3]
- [Total: 4]**

- 6 (a) column lengths accurate;  
labelled;  
see below



- (b) vital capacity increases with/is (directly) proportional to body mass; [1]

- (c) similar proportionality between vital capacity and mass;  
more marked effect in girls;  
wider range of body masses/vital capacities in girls;  
might expect wider range of vital capacities because of wider mass range;  
actual numbers quoted; [max 2]

- (d) height;  
exercise/training/singing;  
asthma;  
AVP; [max 1]

[Total: 6]

- 7 (a) process 1; [1]

- (b) to produce more bone cells/bone growth;  
bone repair/replacement; (ignore bone marrow)  
to produce (more) blood cells; (expandable below:)  
red blood cells;  
white blood cells;  
platelets; [max 2]

- (c) testis;  
ovary;  
gonads; [max 1]

[Total: 4]

Section B

8 (a)

carbohydrates	proteins	fats	
bread/rice/pasta/ potatoes/fruit/reasonable alternative;	meat/fish/eggs/cereals/ peas/beans/ reasonable alternative;	fatty meat/vegetable oils/ reasonable alternative;	[3]
1 from			
energy source/storage; (cellulose =) fibre, (prevents constipation)	growth and repair; components of haemoglobin/some hormones e.g. insulin, enzymes;	(long term) energy source/ storage material; vitamin <u>A</u> / vitamin <u>D</u> solvent; role in cell membranes;	[3]
glucose/fructose/ <b>accept</b> simple sugars;	amino acids/peptides	fatty acids (glycerol);	[3]
carbohydrase/amylase/ maltase/reasonable alternative;	protease/pepsin/trypsin/ reasonable alternative;	lipase;	[3]

(b) required to break down/convert;  
large/insoluble;  
(molecules into) smaller/soluble; (products)  
which can be absorbed/enter blood stream;

[max 3]

**[Total: 15]**

Page 7	Mark Scheme: Teachers' version	Syllabus
	GCE O LEVEL – October/November 2011	5096

- 9 (a) **heat:**  
is a form of/thermal energy;  
causing molecular movement;  
measured in calories/Joules;  
**temperature:**  
is a measure/amount/intensity of heat/relative measure of how hot or cold something is;  
a scale of numbers/measured in degrees;  
measurement of average kinetic energy of the particles; [max 2]
- (b)  $37^{\circ}\text{C}/98.4^{\circ}\text{F}$ ; (accept range  $36.5-37.5^{\circ}\text{C}$   $97.7-99.5^{\circ}\text{F}$ ) [1]
- (c) fever/infection;  
exercise;  
ovulation;  
pregnancy;  
menopause;  
hot food/drink;  
hot environment;  
shower/sauna;  
too many clothes; [max 3]
- (d) shivering;  
muscles/liver/tissues release heat;  
from metabolism/respiration;  
brown fat involved; [max 2]
- (e) 1:  
sweat glands;  
secrete/produce sweat; (ignore excrete)  
water;  
evaporates;  
specific latent heat/heat of evaporation;  
cools (skin/blood);
- 2:  
arterioles open/vasodilation; (ignore capillaries open/expand) (reject move/migrate)  
blood flows near(er) to skin surface;  
in capillaries; (superficial capillaries = 2 marks)  
heat radiates away/convects;  
(cools: if not stated above) [max 7]

[Total: 15]

Page 8	Mark Scheme: Teachers' version	Syllabus
	GCE O LEVEL – October/November 2011	5096

Section C

- 10 (a) Explain why houseflies are considered as important factors in the spread of disease. Refer to a named example of diseases in your answer.

up to 7 from:

**below to a max 2**

(disease + causative organism: 2 max)

cholera; *Vibrio cholerae*;

typhoid; *Salmonella typhi*;

other suitable example

e.g. 'food poisoning': *Salmonella*;

dysentery: *Shigella*; / *Entamoeba*;

(no named example: 6 max)

**below to a max 6**

(adult flies:)

feeding/walking on faeces/sewage;

**and** human food;

transport/transfer bacteria (ignore disease)

act as vector;

fly to new location;

action of proboscis;

saliva out;

saliva in;

bristles on body/suction cups/pads on feet;

defecation;

lay eggs/fly blow;

maggots/larvae burrow;

pupae metamorphose/emerge as adult;

[max 7]

Page 9	Mark Scheme: Teachers' version	Syllabus
	GCE O LEVEL – October/November 2011	5096

- (b) Explain how a knowledge of the life cycle and habits of houseflies influences/determines the ways in which food is prepared and domestic refuse is collected for disposal.

up to 8 from:

in kitchens/eating areas:

insecticide spray;

fly strips;

electrocution grids/UV light traps;

swatting;

keeping food/utensils covered;

prevents access by flies;

designated food areas/boards;

food hygiene;

hand washing;

lavatory etiquette;

refrigeration;

bins;

lids;

(plastic) bags;

sealed/knotted;

sited away from, housing/food preparation areas;

to prevent access by flies;

regular collection/disposal;

before eggs/larvae/pupae turn into adults;

burning;

kills all stages;

removes source of food;

landfill;

(final) covering prevents access;

recycling/composting;

cover/too hot;

[max 8]

[Total: 15]

Page 10	Mark Scheme: Teachers' version	Syllabus
	GCE O LEVEL – October/November 2011	5096

11 (a) Describe the processes involved in treating impure water from a river so that it is suitable for drinking.

up to 8 from:

screening / filtration;  
 storage in reservoir / settling tank – (may be mentioned at end – credit once only);  
 UV light sterilises;  
 flocculation / coagulation;  
 names / (formulae) of flocculating agents e.g. iron(III) hydroxide / chloride / sulfate, aluminium hydroxide / sulfate, synthetic polymers;  
 sedimentation (in tank);

filtration via (coarse) rapid sand filter;  
 mention of little biological activity / no biofilm;

**OR**

filtration via (fine) slow sand filter;  
 mention of biological activity / jelly like film from microbes / biofilm;

**OR**

other filtration e.g. membrane / activated carbon / charcoal / reverse osmosis;

disinfection;  
 with chlorine / chlorine compounds / ozone / UV light (if not referred to above);

other treatment e.g. fluoridation / conditioning with sodium carbonate (soda ash); [max 8]

(b) Describe the processes involved in making impure water from a river into a form that is suitable for drinking.

up to 7 from:

aseptic techniques ... described / disinfected bench / lighted burner;  
 sterilise medium ... autoclave / pressure cook / boil media OK; (ignore just melt)  
 medium ... (nutrient) agar / broth / medium;  
 apparatus ... pipettes / loops;  
 sterile apparatus ... e.g. loop heated;  
 dilution ... series / described – sterile water / buffer;  
 inoculation ... spread on agar / pour plate / explanation;  
 quantitative ... with known / fixed volume / number of drops of sample;  
 apparatus ... petri dishes / plates / broth in tubes / flasks / other suitable apparatus e.g. membrane filtration;  
 (not) exposed to air ... for minimal time / bottle mouth passed through flame;  
 incubate ... explanation;  
 examine ... after appropriate time (12–48 hr);  
 count ... colonies / rate coverage of petri dishes / assess turbidity of broth / colonies on membrane;  
 comparison ... e.g. more colonies from river water (**B**) / broth looks cloudier; [max 7]

[Total: 15]