

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

5096 HUMAN AND SOCIAL BIOLOGY

5096/21

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	Paper
	GCE O LEVEL – May/June 2011	5096	21

- 1 (a) (i) transport of carbon dioxide/CO₂; 1
- (ii) (mark boxes independently)
- A = phagocyte; (accept alternative names for phagocyte)
function = phagocytosis/AW;
- B = lymphocyte;
function = forms antibodies;
- C = plasma;
function = transports products of digestion (or named examples)/carbon dioxide/urea/hormones/heat; [6]
- (b) prevents blood loss;
prevents entry of pathogens/AW;
protects new cells forming underneath; [max 2]
- (c) identification of 5 cm³/100 cm³ of blood (20 – 15) as loss in capillaries;
 $5 \times 100/20 = 25$ (%); [2]
- (d) (i) iron is needed to make haemoglobin;
F has less haemoglobin in blood than normal/AW; [2]
- (ii) F has increased cardiac output/AW; [1]
- (e) cardiac output for G is much less than normal/D;
more oxygen (than normal/D) is lost as blood passes through capillaries; [2]
- (f) E has normal amount of haemoglobin in the blood;
lower than normal amount of oxygen is carried in the blood;
cigarette smoke contains carbon monoxide;
carbon monoxide combines with haemoglobin;
leading to less oxygen combining with haemoglobin;
as a result, cardiac output is increased; [max 4]

[Total: 20]

Page 3	Mark Scheme: Teachers' version	Syllabus	Paper
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- 2 (a) label to the
N small intestine; (accept anywhere beyond pyloric sphincter)
P colon; (accept anywhere between caecum and rectum, label lines to end on wall or lumen) [2]
- (b) increases surface area of food;
for more enzyme activity/digestion more rapid;
food pieces are smaller/for easy swallowing;
food mixed with saliva/starch digestion started; [max 2]
- (c) food contains bacteria/pathogens;
which are killed by acid/acid sterilises food; [2]
(ignore references to gastric protease activity)

[Total: 6]

- 3 (a) label to the
L blind spot;
M cornea; [2]
- (b) (i) lens becomes thicker/fatter/diameter is reduced; [1]
- (ii) ciliary muscles contract;
ciliary body reduced in diameter;
suspensory ligaments slacken; [3]
(ecf, allow the opposites if thinner lens is given in (b)(i) to a max of 2 marks)
- (iii) pupil becomes smaller in diameter; [1]
- (iv) circular muscles in iris contract;
radial muscles in iris relax;
reference to pupil reflex/nervous system involvement; [max 2]
(ecf, allow opposites for muscle action if pupil enlargement given in (b)(iii) to a max of 1 mark)

[Total: 9]

Page 4	Mark Scheme: Teachers' version	Syllabus	Paper
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- 4 (a) **A** both axes labelled and units given;
P plots correct;;
L smooth, unbroken/straight line going through all plots; [4]
(plots +/- 0.5 square, bar chart is max 3)
- (b) nitrate/nitrogen needed to make more plant protein/amino acids; [1]
- (c) 80 kg per ha on one field = yield of 8 200 kg per ha;
+ untreated field = yield of 2 200 kg per ha;
total 10 400 kg;
40kg per ha on two fields = yield of 6 000 kg per ha × 2 = 12 000 kg – greater yield than
10 400 kg;
(accept same points made in words) [max 3]
- [Total: 8]**
- 5 (a) (i) bacteria/fungi/microbes/micro-organisms/named organism; [1]
(ignore germs, reject viruses)
- (ii) flies visit waste tips/excreta to lay eggs/to feed;
collect bacteria on their bodies/mouth parts/in digestive system;
bacteria in faeces deposited on agar;
bacteria transferred from feet/body to agar;
flies feed on liquid food only;
bacteria on proboscis/mouth parts transferred to agar when fly feeds;
bacteria in saliva transferred to agar when fly feeds;
bacteria transferred to agar when fly regurgitates during feeding;
growth of spores/cells during incubation; [max 5]
- (b) second identical dish opened briefly at times of fly insertion and removal and
incubated with the other dish/unopened dish; AW [1]
- [Total: 7]**
- 6 (a) student J; [1]
- (b) (i) cheese and beef; (both needed) [1]
- (ii) oily fish; [1]
- (iii) leafy vegetable; [1]
- (c) the part of the food that cannot be digested; [1]
(accept cellulose/plant cell walls)
- [Total: 5]**

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7 heat gain

metabolic processes in cells;
 especially liver;
 muscle contractions;
 shivering;
 heat release from energy conversions;

[max 3]

heat retention

layer of subcutaneous fat;
 fat is poor conductor of heat;
 wearing of clothing traps air;
 air is poor conductor of heat;
 vasoconstriction / arterioles in skin narrow;

less blood flow to body surface;
 blood transports heat; *
 reduced heat loss;
 by radiation / convection; *
 sweat production reduced;
 less heat lost by evaporation;
 latent heat; *

[max 7]

heat loss

vasodilation / arterioles in skin widen;
 increased blood flow to the body surface;
 blood transports heat; *
 increased heat loss;
 by radiation / convection; *
 sweat production increased;
 more heat lost by evaporation;
 latent heat; *
 (ignore reference to loss of heat during expiration)

[max 5]

credit the following points if mentioned anywhere in answer:

body temperature variation detected by hypothalamus / brain;
 response controlled by nerves;
 reference to homeostasis;

the marking points with an asterisk (*) to be credited once only

[Total: 15]

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- 8 (a)** gives shape to body;
 supports body;
 makes movement (over the ground) possible;
 protects soft tissue/named tissue or organ;
- from blows;
 from crushing (by suspension);
 muscle attachments;
 bones work as levers;
 production of red blood cells;
 production of (some) white blood cells; [max 6]
- (b)** tendons attach muscle to bone;
 strength without elasticity required;
 contains white fibrous/collagen fibres;
 ligaments attach bone to bone;
 strength with elasticity required;
 contains yellow/elastin fibres; [max 5]
- (c)** mitochondria site of energy transfer;
 process of respiration;
 glucose and oxygen;
 broken down to carbon dioxide and water;
or chemical equation;;
 (chemical) energy released;
 transfer to mechanical energy; [max 4]
 (accept if anaerobic respiration covered)

[Total: 15]

Page 7	Mark Scheme: Teachers' version	Syllabus	Paper
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9 (a) measles virus/antigen recognised by lymphocyte;
specific antibody produced;
very rapidly;
by memory cells (developed during previous attack);
virus destroyed/immobilised;
before it can reproduce and cause illness; [max 5]

(b) TB is more expensive/difficult to detect than smallpox;
TB is more difficult to treat than smallpox;
infectious period less clearly marked than in smallpox;
infectious period much longer than in smallpox;
TB bacterium can form spores – infection from dust possible;
TB vaccine less effective than that for smallpox;
TB bacillus can become resistant to antibiotic treatment;
TB has much longer treatment period than smallpox;
successful TB treatment has higher requirement for patient to have good diet/
health/living conditions/fixed abode/understanding of treatment regime;;
people with immunity more difficult to detect than with smallpox;
reservoir of TB infection in cattle – not with smallpox;
need to test/treat cattle for TB;
phagocytes cannot digest TB bacillus but can digest smallpox virus;
immunity to TB shorter lasting than with smallpox;
AVP; [max 4]
(accept reverse argument for smallpox)

(c) spread by body fluids (in general);
prevention – hygienic practices/AW;
spread by unprotected sex;
prevention – use of condom/femidom;
spread by blood transfusions;
prevention – test blood/heat treat blood;
spread by use of contaminated needles in drug injections;
prevention – only use sterile needles/needle exchange schemes;
(preventative measure must be linked to the method of spread)

credit other methods of spread not in syllabus:
e.g. biting, kissing, across placenta, breast milk, organ transplants;
+ preventative measure must be linked to method of spread and measure given
must be feasible; [max 6]

[Total: 15]

Page 8	Mark Scheme: Teachers' version	Syllabus	Paper
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10 (a) (i) state of physical; and mental well-being;
dependent on receiving: balanced diet;
appropriate physical activity;
appropriate mental activity; [max 2]

(ii) loss of health;
resulting from disturbance of normal processes of the body; [2]

(b) spread

Vibrio cholerae/bacteria;
in contaminated water;
raw foods washed in contaminated water;
inadequately cooked shellfish from contaminated water;
houseflies; (to a max 3)

prevention

isolate patients;
hygienic disposal of faeces/vomit;
contaminated clothing contained to prevent fly contact;
contacts treated with antibiotic/drug to kill organism;
inoculation/vaccination;
hygienic sanitation;
control of flies;
chlorinate drinking water;
individual hygienic practices;
travel restrictions;
quarantine; (to a max 5)

[max 7]

(c) deficiency/nutritional disease;

e.g. rickets/anaemia etc.;
degenerative disease;
e.g. heart disease/renal failure etc.;
inherited disease;
e.g. sickle cell anaemia/Down's syndrome etc.;
environmental disease (accept pollutant);
e.g. lead poisoning/CO poisoning/etc.;
(allow metabolic/transmissible/mental/occupational/(or other) categories with examples)

[max 4]

[Total: 15]