

**MARK SCHEME for the May/June 2010 question paper
for the guidance of teachers**

5096 HUMAN AND SOCIAL BIOLOGY

5096/21

Paper 21 (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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- 1 (a) red / erythrocyte ; [1]
- (b) 1. allows change of shape / flexible ;
to squeeze through capillaries ;
2. very small / AW / 7.5 – 10 µm ;
large numbers ;
biconcave / AW ;
large surface area ;
maximum / greatest absorption ;
correct ref. to diffusion ; [max 6]
- (c) (i) less haemoglobin ;
less O₂ carriage ;
less CO₂ carriage ; [max 2]
- (ii) parents **RS × RS** ;
child **SS** ;
diagram:
- | | | |
|----------|----------|----------|
| | R | S |
| R | RR | RS |
| S | RS | SS |
- ; [3]
- (d) **A** – capillary ;
B – white blood cell / phagocyte / granulocyte ; [2]
- (e) (i) clumping / sticking together / AW ;
ref antibodies ;
- (ii) engulfing / ingesting ; [3]
- (f) (i) fibrinogen ; [1]
- (ii) fibrin ; [1]
- (iii) enzyme ; [1]
- 2 (a) (i) **H** – 15 °C
I – 65 °C
J – 35 °C ;
(2 marks for 3 correct, 1 mark for 1 correct) [2]
- (ii) enzyme denatured / destroyed ;
(**J**) (near) optimum temperature / AW ; [2]
- (b) wash for longer / change pH ; [1]

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- 3 (a) muscles work only when contracting ;
they can only pull / cannot push ;
second muscle to pull in opposite direction / to reverse movement ; [3]
- (b) (i) motor neurone ;
sensory neurone labelled ;
- (ii) triceps labelled ; [3]
- (iii) arrow correctly applied to upper receptor and labelled ; [1]
- 4 (a) less fat ;
deposits in blood vessels / arteries / less atheroma ; [2]
- (b) correct (proportions of) nutrients ;
correct temperature ;
contains antibodies ;
not likely to be allergenic ; [max 3]
- 5 (a) (i) malaria (accept any other *Anopheles*-borne disease) ; [1]
- (ii) (female) mosquito / *Anopheles* ; [1]
- (b) cover arms / legs / body + prevent bites ;
close windows / doors + prevent entry of mosquitoes ;
sleep under net + to prevent bites ;
cover water tank + to prevent breeding of mosquitoes / AW ;
take prophylactics + to kill larvae in blood ;
use insecticide / coils + to kill mosquitoes ;
use repellent + to discourage mosquitoes / AW ;
(accept in any order, correct pairing for one mark) [max 4]
- 6 (a) label to bulge in inner layer to right of bolus ; [1]
- (b) large intestine / colon ; [1]
- (c) (i) villus ; [1]
- (ii) folds to create large surface area ;
for water absorption (in (a)) ;
named substance absorption (in (b)) ;
ref. villi contain capillaries / lacteals / even greater increase in surface area ; [max 3]

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- 7 (a) glucose ; [1]
- (b) glycogen + stored in liver ;
adrenalin converts glycogen to glucose ;
glucose released into blood ; [max 2]
- (c) (blood sugar) used up in respiration ;
reconverted to glycogen / ref insulin ;
(adrenaline) broken down in liver ;
adrenaline released only as required ; [max 3]
- 8 (a) harmful substances (reject examples) ;
resulting from human activity ;
into the environment ; [3]
- (b) (i) untreated sewage ;
chemical waste ;
named e.g. ;
from industry ;
from agriculture ;
fertilisers (or named) ;
pesticides / herbicides (or named) ;
oil spillage ; [max 5]
- (ii) cholera / typhoid + untreated faeces ;
schistosomiasis + untreated sewage ;
fertilisers + eutrophication / increased plant growth ;
eventual death of aquatic organisms / all oxygen used up ;
death of water plants + herbicides ;
death / harmful effect on water animals + pesticides ;
oil kills water birds ;
heavy metals, or named, enter food chain ;
consumed by people who eat the fish ; [max 7]
- 9 (a) (similarities)
cytoplasm / ribosomes ;
nucleus ;
cell membrane ;
mitochondria ;
- (differences)
cell wall ;
vacuole ;
chloroplasts ; [max 5]

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- (b) (cytoplasm) where cell reactions occur ;
 (nucleus) controls cell metabolism ;
 contains DNA ;
 genes ;
 protein manufacture ;
 (membrane) partially permeable ;
 controls passage of chemicals into / out of cell ;
 ref. osmosis ;
 active transport ;
 (mitochondria) respiration / energy release ;
 (cell wall) turgidity / support of cell / protection ;
 (vacuole) maintenance of hypertonicity ;
 for osmosis ;
 (chloroplasts) for carrying out photosynthesis ;
- [max 10]

10 Either

- (a) depressant / AW ;
 euphoria / AW ;
 tolerance / AW ;
 addiction ;
 withdrawal symptoms ;
 crime to fund habit ;
 family / relationship breakdown ;
- [max 5]
- (b) (i) 'flu-like symptoms (at first) ;
 destruction of white blood cells / lymphocytes ;
 lowered resistance to relatively minor infections ;
 general weakness ;
 disorders of the blood ;
 pneumonia ;
 of the nervous system ;
 cancers (e.g. Kaposi's) ;
- [max 5]
- (ii) carriers of HIV / virus ;
 (unprotected) sexual intercourse / contact ;
 blood transfusion ;
 shared needles ;
 body fluid to body fluid (accept examples) ;
 from infected mother to fetus ;
- [max 5]

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10 Or

- (a)** (for pulmonary TB)
 loss of appetite ;
 loss of weight ;
 cough ;
 blood in sputum ;
 fatigue ;
 breathing difficulties ;
 fever / night sweats ;
 a non-pulmonary symptom (e.g. skin lesions / bone degeneration) ; [max 5]

- (b)** bacterium;
Mycobacterium ;
 spores ;
 resistant ;
 spitting ;
 carried in dust ;
 coughing / droplet infection ;
 pasteurisation of milk ;
 isolation of patient ;
 use of handkerchiefs / sputum bottles ;
 avoid overcrowding ;
 ensure good ventilation ;
 BCG vaccination ;
 regular X-rays ;
 antibiotics (e.g. streptomycin) ; [max 10]

(Some of the points may gain marks under how the disease is spread, **or**, as the reverse argument, that is how it can be controlled).