

MARK SCHEME for the May/June 2007 question paper

5096 HUMAN AND SOCIAL BIOLOGY

5096/02

Paper 2 (Theory), maximum raw mark 100

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Page 2	Mark Scheme	Syllabus	Paper
	GCE O LEVEL – May/June 2007	5096	02

- 1 (a) St. moves out / up / left;
Di flattens / moves down, contracts. [2]
- (b) volume increases;
pressure decreases. [2]
- (c) (i) mucus traps; particles / bacteria / dust; R lubrication [2]
(ii) move mucus; upwards / away from lungs. R filters [2]
- (d) 1 more mucus;
2 cilia shorter / less developed / damaged. Ignore number refs i.e. less, fewer [2]
- (e) (i) tar.
(ii) nicotine.
(iii) carbon monoxide. [3]
- (f) (i) exercise requires respiration / energy; R refs to oxygen
more carbon dioxide formed / released;
carbon dioxide triggers / stimulus for (brain / breathing). [max. 2]
(ii) automatic / AW;
can go to sleep / think of other things etc. [2]
- (g) more carbon dioxide now exhaled;
lowers carbon dioxide levels (in blood); ignore refs to oxygen,
takes longer (for carbon dioxide);
to reach threshold level / to make you breathe. [3]
- [Total: 20]**
- 2 (a) X = brain / hypothalamus / osmoreceptors
Y = pituitary gland
Hormone = ADH [3]
- (b) (i) decreases;
(ii) increases;
(iii) decreases. [3]
- [Total: 6]**

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- 3 (a) (i) larger relative surface area / s.a. large relative to volume;
so more heat lost / less heat generated. [2]
- (ii) blood closer to surface; so heat lost more easily. **R** refs to insulation here. [2]
- (iii) less insulation; [1]
- (iv) generates less heat. **A** opposite – shivering generates heat [1]
- (b) (i) foil reflects body heat / keeps heat in / so body heat not lost; **R** insulates
- (ii) prevents evaporation / slows sweating / reduces loss by sweating. [2]
- [Total: 8]**
- 4 (a) (i) bacteria / germs / microbes; (**A** only once) **R** viruses.
entered A (from air);
grew / reproduced in A;
could not enter C / C corked / C no bacteria. **A** A not corked. [max. 2]
- (ii) disinfectant; added in D;
no growth of bacteria / inhibits / kills bacteria. [max. 2]
- [Total: 4]**
- 5 (a) A = pupa
B = larva **R** wriggler [2]
- (b) oil / paraffin on water; insecticide in water. [2]
- (c) (i) introduce fish to eat them / Gambusia.
- (ii) Bacillus / B. thuringiensis. [2]
- (d) non-polluting / ref. to build up in food-chain of chemicals / no harm to humans;
A opposite disadvantages of chemicals, **R** cost refs
no resistance to them is possible. [2]
- [Total: 8]**

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- 6 J = to fovea;
K = to edge of retina;
L = to blind spot.
M = to ciliary muscle.
N = to iris

[5]

[Total: 5]

- 7 P = viruses
Q = Fungi
R = Bacteria
S = Protozoa

[4]

[Total: 4]

[Section A = 55]

- 8 (a) Distinguish between the terms *signs* and *symptoms* of a disease, giving an example of each for *cholera*.

sign is what an observer sees in a patient; watery stools / diarrhoea / sweating vomiting. (2)

symptom is what patient feels; fever / feels hot / cramps / stomach ache / thirst / headache. (2)

[4]

- (b) What is the causative organism of cholera?

bacterium / Vibrio.

[1]

- (c) Explain why after a natural disaster, such as an earthquake or flood, an outbreak of cholera may occur.

earthquake can fracture pipes; so (treated) water can be contaminated with faeces / pathogens / sewage.

flooding can wash sewage (from latrines / fields); into water supplies.

[4]

- (d) Vaccines are available for many diseases.

Explain

- (i) what is meant by the term *vaccine*.

mark (d) straight through up to 6.

is active (immunisation);

- (ii) how vaccines provide protection against infectious diseases.

dead / weakened / inactive / attenuated bacteria / viruses injected into patient;

white blood cells / lymphocytes;

make antibodies;

which clump / agglutinate / lyse pathogens;

system has memory / has memory cells; **R** blood remembers

takes some time to develop / need vaccinating before disease arrives;

disease dealt with, if met, before it can affect person/before symptoms;

A prepares body to fight disease if linked.

longer lasting / antibodies stay in system / in blood / in body;

can be boosted by further injections / treatments at intervals.

[max. 6]

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9 (a) Define the term enzyme and describe the main features that all enzymes have in common.

is a catalyst;
 made in cells / in living organism / is biological; *biological catalyst* = 2
 speeds up reaction; **R** alters reaction.
 does not alter products;
 is not altered itself;
 effective in small amounts.
 is a protein;
 sensitive to pH; **R** all have own pH.
 is specific;
 temp. sensitive / has optimum temp. / inactivated at low temp.;
 destroyed by boiling / above 80°C; **R** at high temp.
 easily poisoned / inhibited / denatured;

[max. 7]

(b) Given a solution of starch and a solution of saliva, describe how you would show that it is an *enzyme* in saliva that converts the starch to sugar.

two tubes / suitable containers

same amount;

* of starch added;

* add saliva to one;

* add **boiled** saliva / **acidified** saliva to second / no saliva / water;

same amount;

* leave for same time / suitable time / up to 30 mins / test every 5 mins;

at same temp. / suitable temp / 20°–60°;

* test each for sugar;

OR

* test each for starch;

* **how**: boil;

* add iodine (solution);

* with equal volume;

* a few drops;

* Benedict's solution;

* blue-black / black = starch;

* red / brown colour / ppt. shows sugar;

* brown / yellow = no starch;

* here boiled / acidified saliva = no sugar / stays blue;

* stays blue / black ;

* so active principle must be an enzyme.

* since boiling / acidification destroys enzyme.

[max. 8]

If only one tube used i.e. only boiled saliva or only saliva, credit points marked * up to 5.

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EITHER

10 (a) Using fig. 10.1 to help you, describe the steps by which a blow on the tendon is converted to a movement of the lower leg.

(blow) stretches muscle;
 (receptor converts stretch into) impulses;
 (impulses) up / via sensory neurone:
 into dorsal root;
 of spinal cord;
 synapse; **R** refs to relay neurone
 via chemical transmission / or named one;
 (impulses down) motor neurone;
 through ventral root;
 to (thigh) muscle;
 muscle contracts;
 pulls on tendon;
 pulling / raising / moving lower leg / tibia.

[max. 8]

(b) Both bone and muscle are *tissues*. State how the structure of bone differs from the structure of muscle.

bone has cells;
 and a matrix;
 (matrix of) calcium salts; **R** refs to hard, inflexible etc.
 and protein / collagen fibres;
 muscle has cells;
 no matrix;
 muscle cells are long (cylindrical) fibres;
 ref. to protein here. **R** refs to flexibility etc.

[max. 5]

(c) Write an equation for the process that supplies the muscle cells with energy.

glucose (sugar) + oxygen; **A** chemicals, if correct formulae. (1)
 carbon dioxide + water (+ energy) (1)

[2]

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OR

- 10 (a) State 4 pollutants that may enter the river as it flows from A to B, and for each pollutant you name, describe its effect on the river water.

One mark for pollutant; one for effect; ×4. First 4 only.

nitrate / fertiliser; eutrophication / renders water unsafe to drink etc.;

phosphate / fertilisers; eutrophication / lowers oxygen levels;

herbicides; damage water plants / algae;

pesticides / insecticides; kill insect life / kill fish / concd. via food chains;

(power station releases) hot water; lowers oxygen levels;

sewage; spreads disease / named one / lowers oxygen (on decay);

and worms / flukes / eggs of gut parasites; named example;

petroleum products / oil; damage to birds / lowers O₂ (on decaying)

detergents / soaps; frothing slows entry of O₂; etc.

heavy metals / chemicals; toxic to life / build up via food chains.

[max. 8]

- (b) River water contains bacteria. Explain how *filtration* and *chlorination* make river water safe to drink.

filter contains sand / gravel;

covered in film / slimy layer;

traps / filters bacteria;

protozoa ingest bacteria;

algae release O₂;

which kills some bacteria;

chlorine sterilises / kills all microbes; R removes here

water in closed tanks;

to give time to act / prevent escape of chlorine.

[max. 5]

- (c) Write out a word equation for the biological process that increases oxygen levels in a river.

carbon dioxide + water; A formulae here if correct, (1)

glucose (sugar) + oxygen (1)

[2]